

The logo for RAME (Research Association Mining and Environment in Vietnam) features the letters 'RAME' in a stylized font. The 'R' and 'M' are black, while the 'A' and 'E' are green. Below the letters is a small graphic of a mine entrance.

Research Association
Mining and Environment
in Vietnam



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RAME - Joint research project „Mining and Environment in Vietnam“

Duration: 06.2007-12.2010

Coordination: Ruhr University Bochum

Prof. Dr. Harro Stolpe (D), Dr. Katrin Broemme (VN)

www.rame.vn

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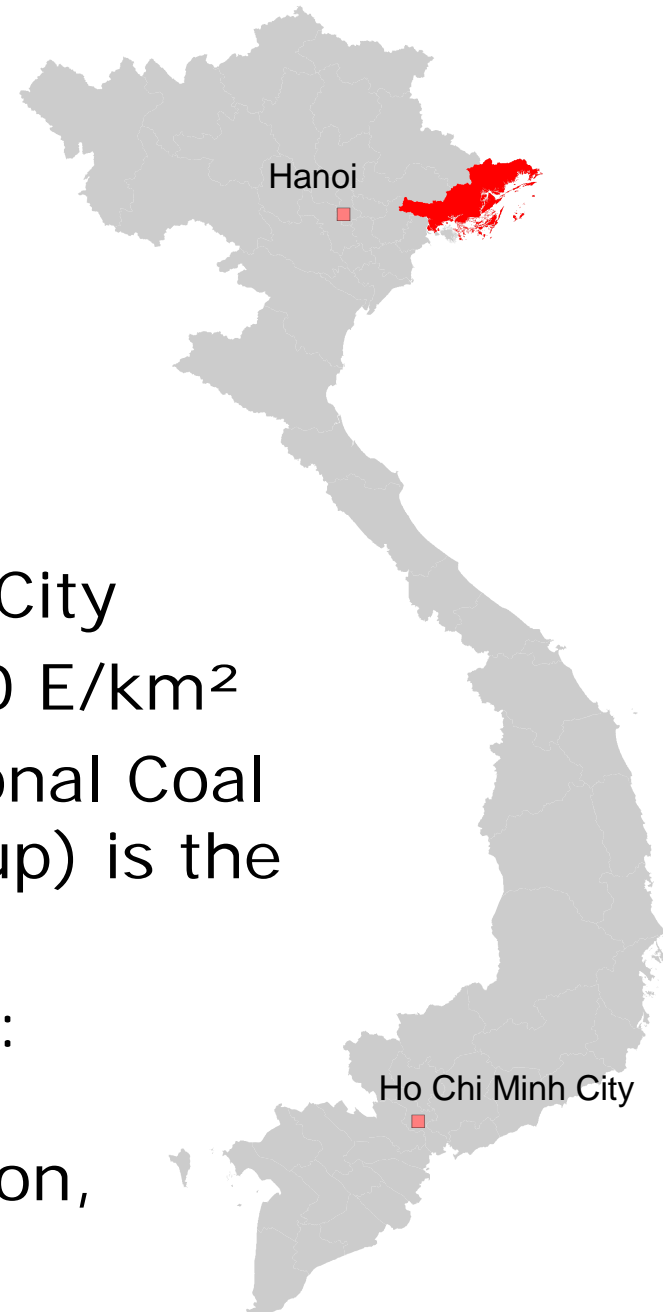
VINACOMIN

Project Area



Quang Ninh

- 95% of the national hardcoal production
- Mining since about 1840,
~170 years
- Provincial capital: Ha Long City
- 1.12 Mio. inhabitants, ~190 E/km²
- VINACOMIN (Vietnam National Coal and Mineral Industries Group) is the biggest employer in QN
- Other main income sources:
tourism, construction
materials, seafood production,
trade with China



Basic facts on coal mining

- High quality Anthracite coal (7200-8300 Kcal/kg, max. 0.6% sulphur, 3-12% ash content)
- Upper Triassic formation
- mining in three areas: Dong Trieu/Uong Bi, Hon Gai and Cam Pha, total area ~350 km²
- 60% open pit mining, 40% underground mining, ~ 30 coal companies
- explored reserves ~ 3.5 billion tons
- Production rate: 42 mio. t / year (2008)
- Domestic use for thermal energy production, cement and fertilizer production
- coal export to Japan, China etc.

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Project Area



Basic facts on Ha Long Bay

- UNESCO World Natural Heritage since 1994
- Part of the Gulf of Tonkin, extension of the Southern Sea of China
- Area of 1,566 km², 1,969 islands
- Full tropical karst formation
- Limestone mounting with heights up to 50 – 100 – 200 m
- Limestone from Carboniferous and Permian eras
- Limestone with a thickness of 2,400 to 2,600 m was deposited in oceanic depressions about 300 mio. years ago during the Caledonian mountain formation
- Lime deposits were subjected to a series of Tectonic phases of lifting and sinking, whereby they also were distorted and cocked
- Corrosion of lime due to deviations in sea level and climate (high temperatures, high precipitation rates)
- Typical richness of shapes characterizing tropical karsts, numerous caves









Landuse Conflicts

UNESCO-World Natural Heritage
Ha Long Bay

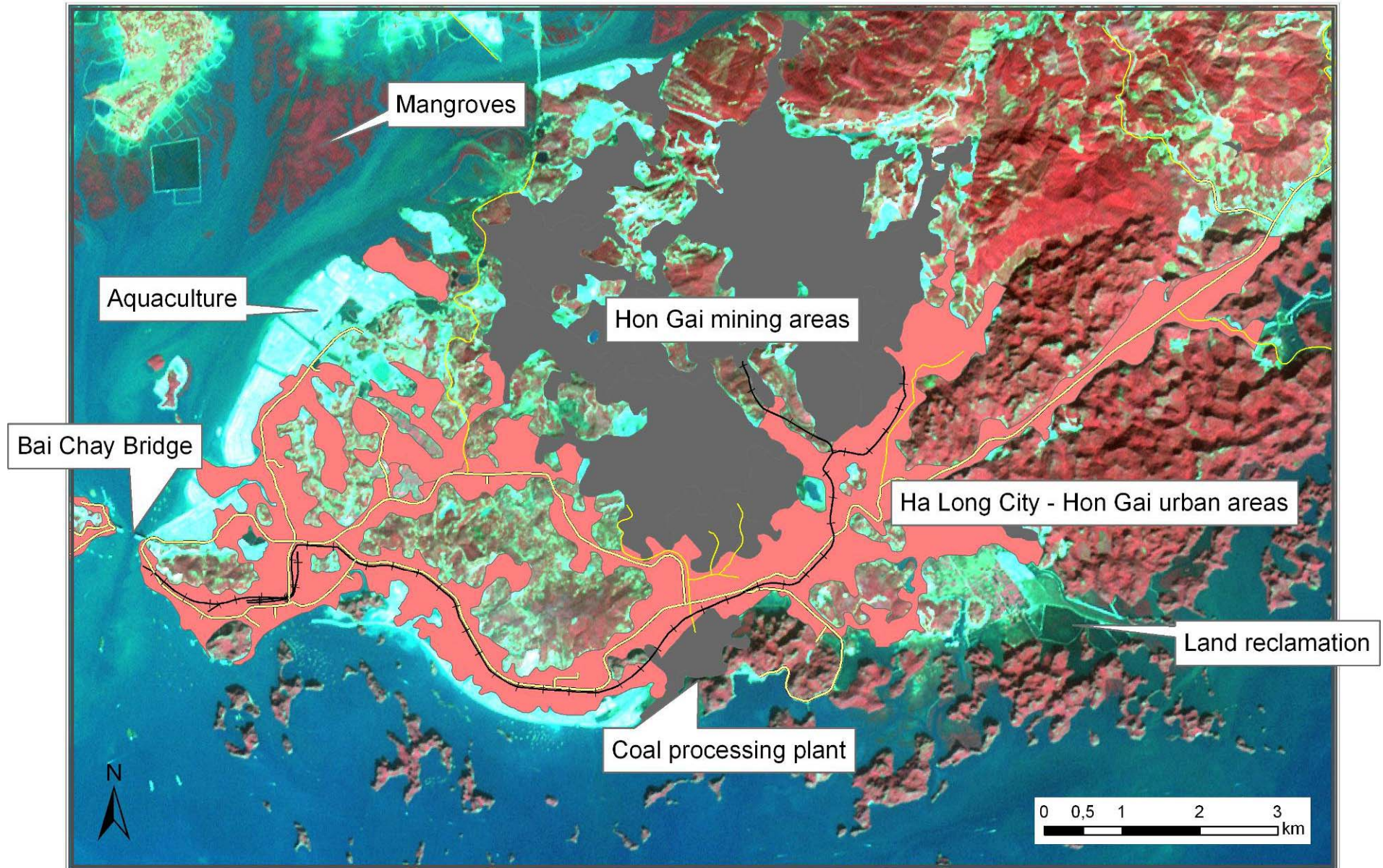
Industry

Residential areas
Ha Long City

Hardcoal Mining



Landuse Conflicts



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Environmental problems in Quang Ninh: Landscape



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Environmental problems in Quang Ninh: Water resources



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Environmental problems in Quang Ninh: Air



Dust emission due to coal transport

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Environmental problems in Quang Ninh: Pollution of residential areas



Residential areas close to the mining areas



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RAME – Project Structure

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eE+E

Environmental Management, Environmental Information System

Capacity Building



Stabilization
of waste
rock dumps



Mine water
treatment



LMBV international
RESOURCES | LANDSCAPE | WATER



Dust
mitigation
and
monitoring



Recultivation
of waste rock
dumps



Constructed
Wetlands zur
Behandlung
bergbaulicher
Wässer



*Methods for
Landuse
Planning after
Mining
(not yet
applied)*



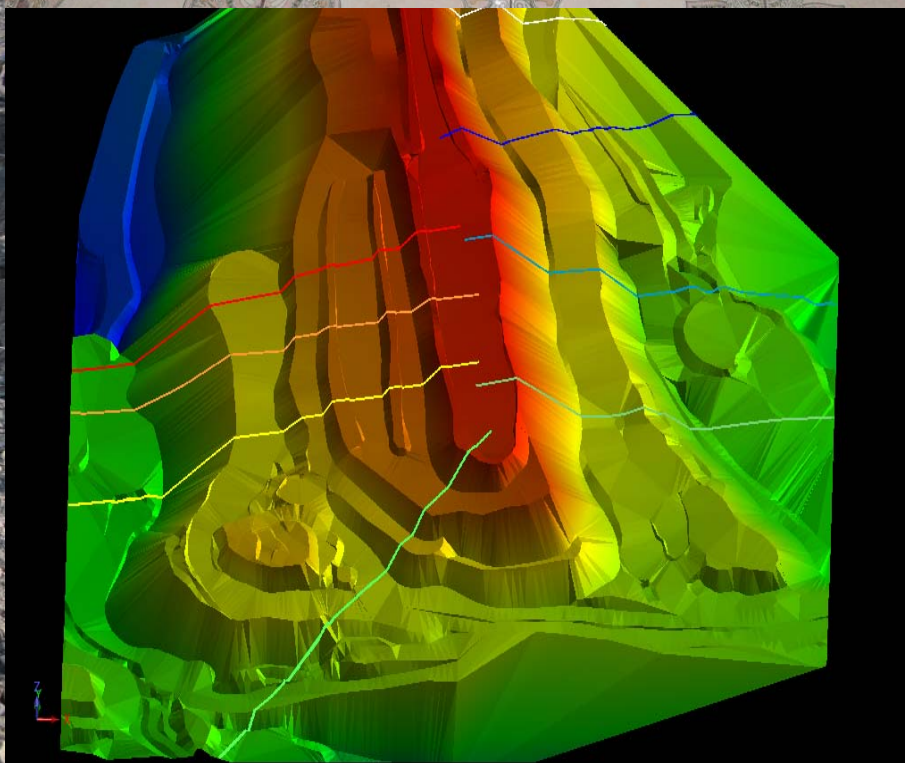


Stabilisation of waste rock dumps: Chinh Bac, Nui Beo



- Investigations on the morphology underneath the foot of the dump
- Investigations on seepage water flows within and through the dump incl. Sampling and analysis, construction of lysimeters
- Monitoring of dump movements (surveying methods)
- Investigations on geomechanical parameters of the waste rock material
- Test dumping in order to test different dumping methods
- Development of numeric models on dump and slope stability



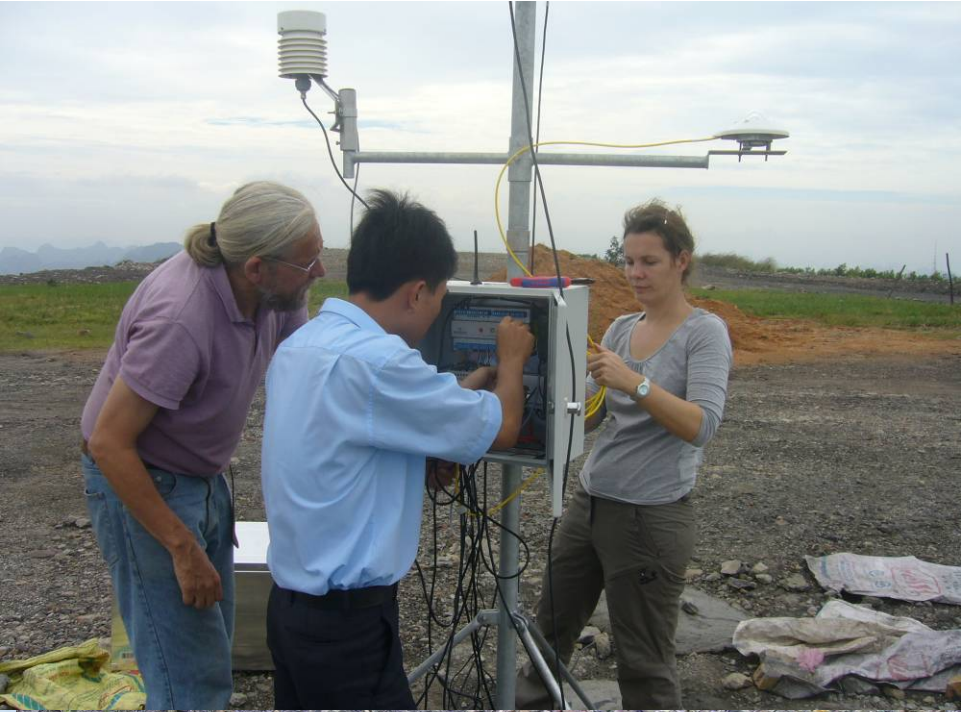




Recultivation of waste rock dumps: Chinh Bac, Nui Beo

- Investigations on the natural vegetation at former waste rock dump sites
- Investigations on the soil characteristics at former waste rock dump sites
- Collection of seeds for germination experiments
- Laboratory tests on the effect of different materials added to the waste rock material in order to improve the soil
- Establishment of an experiment on soil improvement and planting with local plant species
- Establishment of a weather station on Chinh Bac waste rock dump







Mine water treatment: Vang Danh



- Large monitoring program in order to characterize the mine waters at the pilot location Vang Danh (underground mine)
- Adaptation and implementation of the monitoring concepts
- Technical concepts for the treatment of mine and sanitary waste waters at the site
- Laboratory experiments in a smaller scale: neutralisation, sedimentation, sludge properties, iron precipitation, manganese precipitation and filtering
- Development of different options in order to reduce construction costs
- Construction in preparation





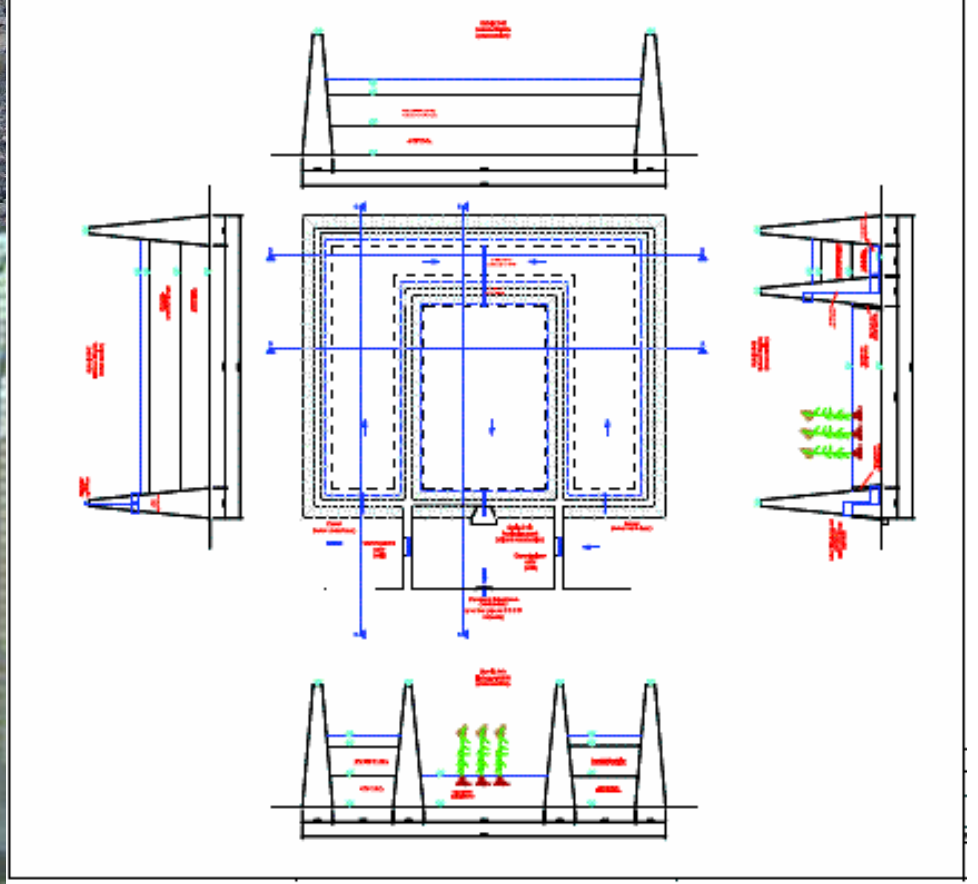


Constructed Wetlands: Dong Trieu



- Sampling and analysis of mine waters in the region Dong Trieu
- Parallel laboratory experiments in Germany on treatment of pH, sulphate, heavy metals etc.
- Site selection for the pilot plant
- Technical concept for the pilot plant
- Construction in preparation
- Further monitoring and optimization
- Recommendations for larger plants





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Thank you for your attention!



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Projektträger
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