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Integrated Management Strategy For Usina Presidente Vargas (UPV) Megasite, Volta Redonda, RJ, Brazil

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Introduction

1. **MegaSites**
   - Mining, seaports, chemical industry complex, military complex;
   - Soil, groundwater and surface water contaminated with a wide variety of pollutants;
   - Complex (technical, geology, industrial process, pollutants, regulatory aspects, costs), more than 5,000m^2;

2. **Problems**
   - Traditional remediation approach is often impossible in short terms – nature and extent of pollution;
   - Could remain a risk factor for humans and ecosystems;
   - Limiting the free use of natural resources.

3. **WELCOME Project**
   - **W**ater, **E**nvironment and **L**andscape **M**anagement at **C**ontaminated **M**egasites;
   - Stepwise based on IMS manual.

4. **Cases**
   - Bitterfelds, Tarnowskie Gory, Rotterdam and Antwerp.

Port of Rotterdam

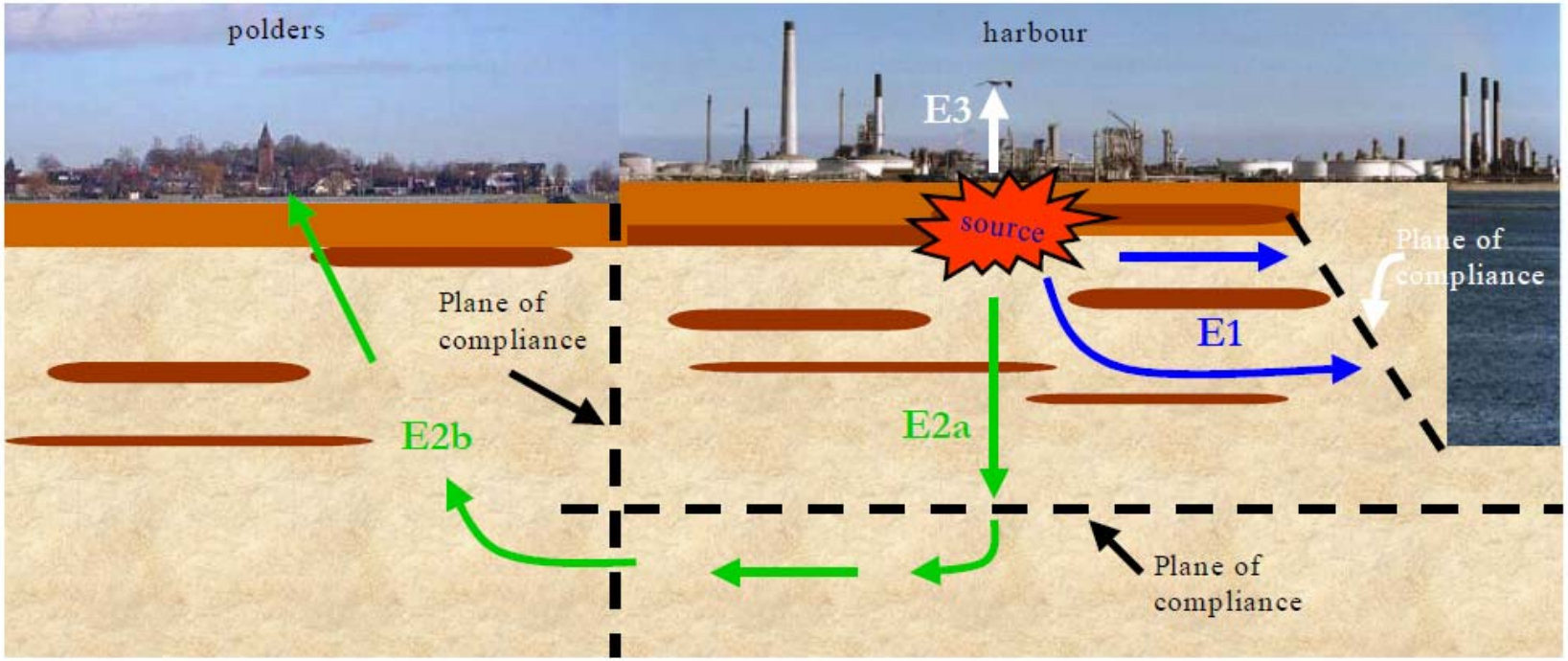


Figure 3 Cluster-based Site Conceptual Model for the Rotterdam Megasite ***(KEY: E1 – emissions to surface water, E2a - emissions to deep groundwater below the harbour, E2b – emissions to deep groundwater that discharges into the polder areas, E3 – emissions to the site surface.***

Usina Presidente Vargas – UPV – Steelmaking plant

Volta Redonda – RJ - Brasil

Founded in 1941, the Presidente Vargas plant is one of the largest integrated steelworks complexes in Latin America;

With an area of approximately 5 km², it operates throughout the chain of steelmaking and has several industrial processes;

The major contaminants are polyaromatic hydrocarbons (PAH) and metals, which can be found in adsorbed phase in soil, free and dissolved phase in groundwater.

Key Features

- Urban expansion surrounding the plant
- Ecological receptors - Paraíba do Sul River
- Several specific soil and groundwater investigations in the last 10 years
- Large data volume generated available

Objectives

1 o Distinguish the areas within MegaSite with the highest risk;

2 o Set up priorities for the level of risk reduction, degree of decontamination and investments based on risk assessment and site specific levels for maximum acceptable pollutants concentrations;

3 o Show the applicability of IMS in Brazil, specially to the Usina Presidente Vargas area.

IMS Integrated Management Strategy – Clusters Based Method

PHASE I

Identify site challenges within the context of the CSM;
Identity the data gaps in the CSM;
Elaborate a working plan to solve these gaps and to identify distribution, absorption &path disruptors for pollutants;

PHASE II

Modelling to reduce risk by identifying non-acceptable pollutants for action and offers substantial cost reduction;
Refine CSM;

PHASE III

Set or revisit site objectives;
Develop interim objectives and adaptive remedial strategy;
Definition of priorization criteria;

PHASE IV

Develop IMS: Building a MegaSite Management Plan, Monitoring Programme, Review Plan.

Review Adaptive Management

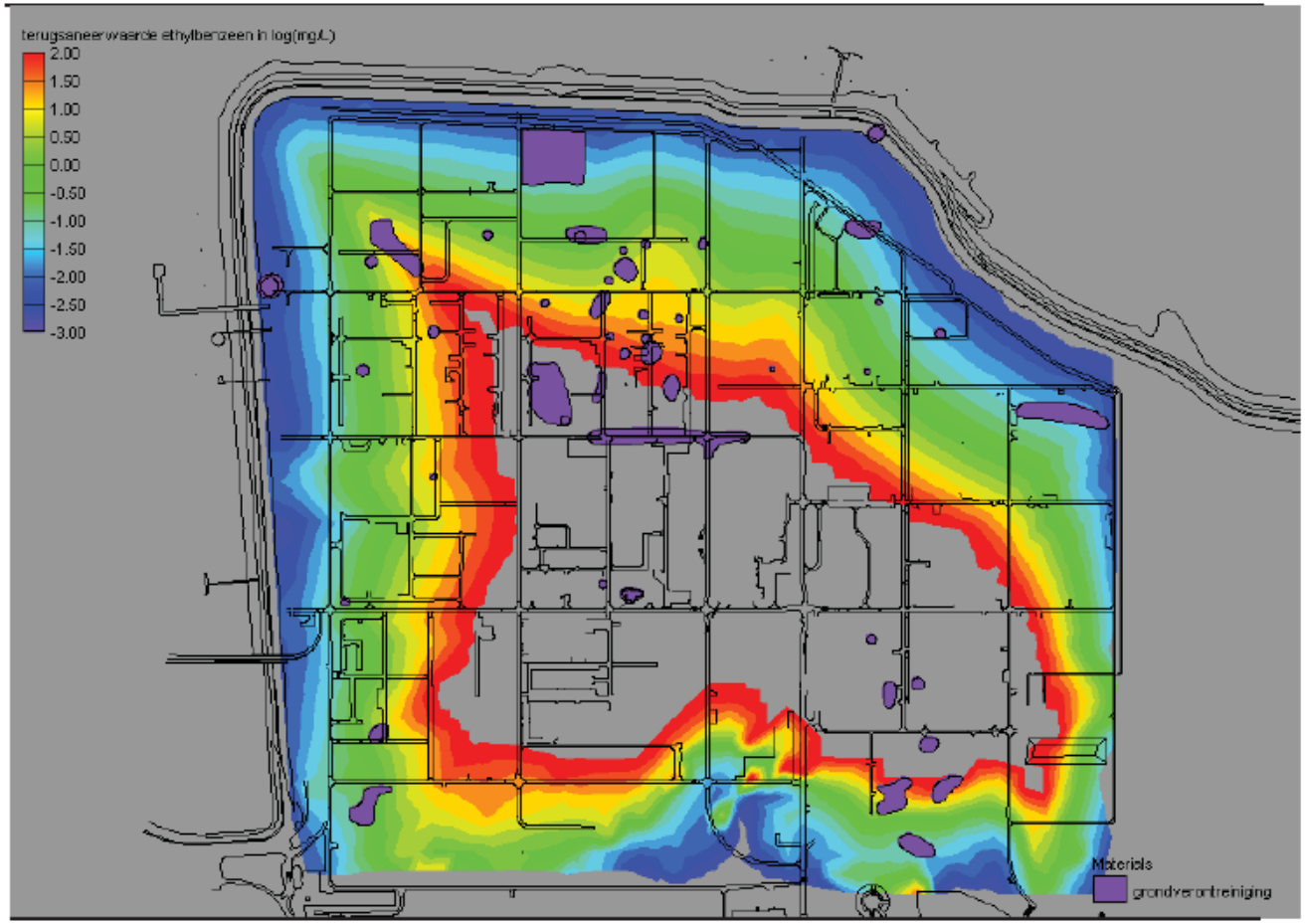
Expected Results

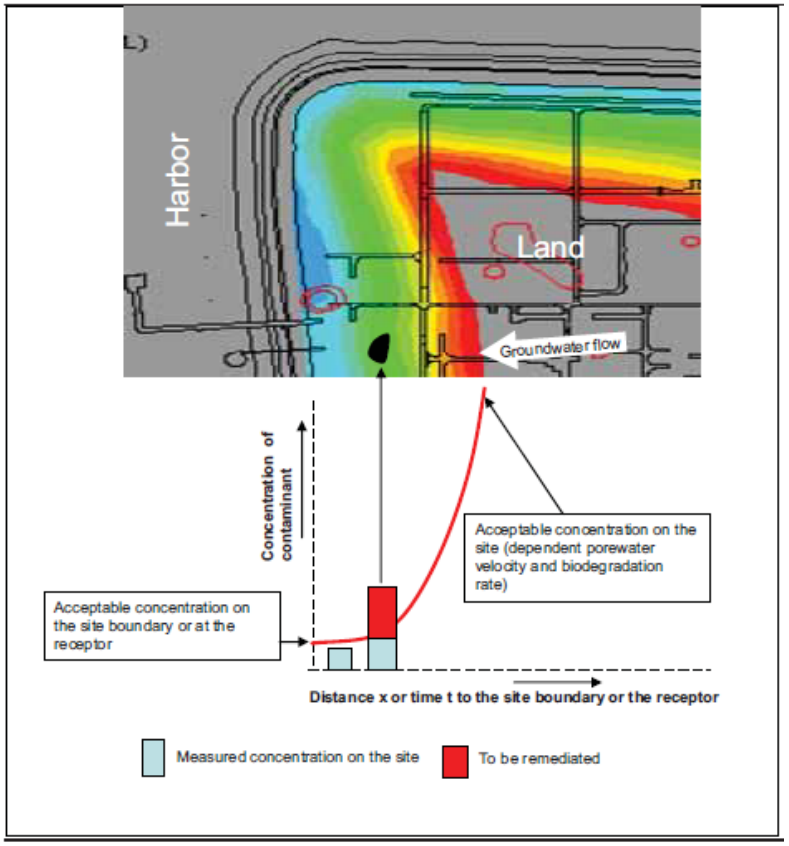
- Based on this information the megasite has been divided into clusters. For each cluster long-term risk reduction targets have been defined, and a cost-efficiency analysis has been performed to determine and select the Preferred RMS.

- The results expected are the elaboration of the following plans:

  - Classification of all on-site areas of concern, according their priority for remedial action considering the sensitive receptors and potential for migration;
  - Elaboration of an investigation plan/ monitoring programme for the different areas of concern, ranked according to urgency;
  - Definition of the limits and contours of a buffer zone using mathematical modelling;

Expected Results

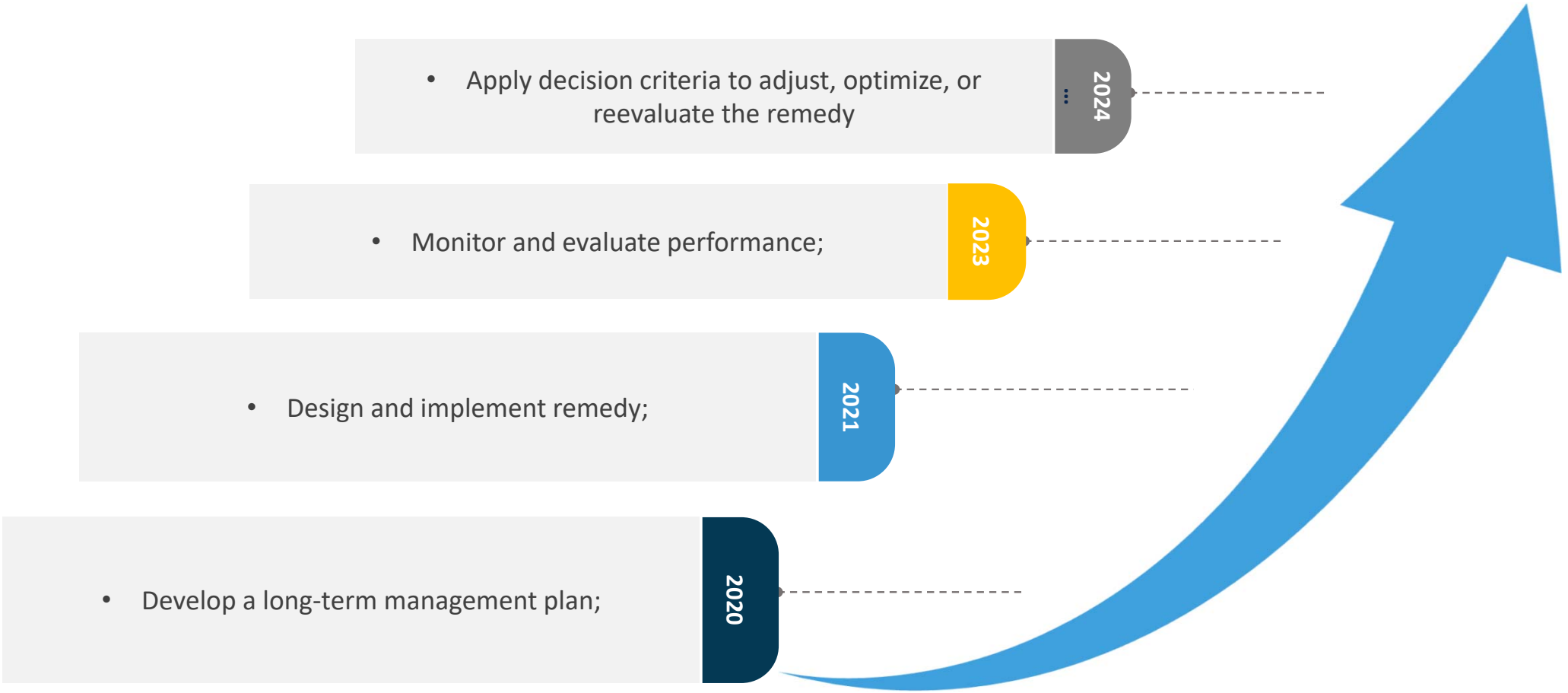




Conclusion

- Megasites are characterized not only for their large extension, but also for the technical complexity:
  - Geological conditions,
  - Diversity of industrial process developed,
  - Variety of pollutants,
  - Regulatory aspects;
  - Elevated costs estimated for rehabilitation;
  - Multiple Stakeholders.
- Traditional approaches for remediation couldn't be applied for short term and the best worldwide practices, includes the adoption of a global remediation strategy, based on a long term, step-wise, approach management program, like IMS;
- Case studies evaluated in this work and compared with the UPV megasite show the feasibility of applying IMS in Brazil to have an effective Megasite Management Plan, Monitoring Program and Review Plan.

Next Steps


• Apply decision criteria to adjust, optimize, or reevaluate the remedy
2024
• Monitor and evaluate performance;
2023
• Design and implement remedy;
2021
• Develop a long-term management plan;
2020

Acknowledgments