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THE FINAL COUNTDOWN.

“Successful remediation policies leads to the end of the Dutch Soil Protection Act”

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Abstract

This paper describes the Dutch focus on remediating all urgent sites with unacceptable risks for human health, ecology or migration of contaminants to the groundwater before the year 2020: the final countdown. When this countdown is completed an era of 40 years of soil remediation will come to an end. This countdown clears the way for the Soil Protection Act to be withdrawn and to be incorporated into the new Environment and Planning Act. The remaining historically contaminated sites will be addressed at a natural moment of redevelopment of brownfields and urban areas. This paper ends with lessons learned over a period of 35 years. Ambition, endurance, collaboration of all stakeholders, focus on urgent sites and political support and sufficient funding are essential for solving a major historical environmental problem.

Keywords: remediation policies, soil protection act, integrated legislation, remediation program, urgent sites, governance

1. Introduction

The Netherlands is situated in the delta of the rivers Rhine and Meuse in the North-Western part of Europe. The Netherlands is a very densely populated country, with 17 million inhabitants. The population density is 400 inhabitants/km², whereas, for comparison, the USA has a population density of 31 inhabitants/km². So the pressure on land is high, especially in urban areas. The same pressures on land occur in other countries with densely populated urban areas. The Netherlands is a prosperous, highly developed country. Administratively, The Netherlands is divided into 12 provinces, 393 municipalities and 24 regional water authorities. All these regional and local authorities are competent in (different areas of) spatial planning, water management and soil and sediment management. The Dutch society is of a social-liberal nature with increasing public awareness for sustainable development and the preservation of natural areas.

Land use, especially in urban areas, is dense (about 90% of the population live in cities). This caused, in earlier times both local (severe) contaminated sites and diffuse (light) contamination. In the topsoil, the groundwater and aquatic sediments, a large variety of contaminants have accumulated. The Netherlands are faced with approximately 60.000 sites that require remediation or some form of management (e.g. containment, capping). Of these 60.000 sites, approximately 2.000 sites pose unacceptable risks and require urgent remediation (approximately 400 for human health, 200 for ecology and 1400 for migration of contamination into groundwater).

The policy on contaminated land has its origin in the early '80's of the 20th century when the first disgrace in soil contamination became apparent. In the small town of Lekkerkerk a residential area had been built upon a former industrial dump site and indoor air concentration of Benzenes caused health problems. This triggered public awareness and political commitment, inventory programs and soil protective policies.

The policy on contaminated land evaluated from a strict preventative policy and a foresight of total multifunctional clean-up of all contaminated sites in the '80s towards a more realistic policy which remained strictly preventative but amended the clean-up ambitions towards functional remediation of heavily contaminated sites. This resulted in the remediation of sites that had to be remediated for other reasons than the environment (i.e. the redevelopment for housing on former industrial sites) and therefore left urgent sites abandoned and not remediated. The soil policy makes a clear distinction between historical contamination and new contamination. The distinction is juridical marked by the year 1987 when the Soil Protection Act came into force. Because of the aim of preventing further soil contamination, polluters have to immediately clean-up any soil contamination which is caused after 1987. No right on pollution! All historically contaminated sites need to be remediated, the urgency depends on the risks. When the risks are unacceptable the remediation should start as soon as possible. In other cases it is preferable to remediate at a natural (redevelopment) moment.

The soil policy and remediation operation is fully decentralized to the 12 provinces and 29 largest municipalities, so in total 41 authorities are competent. The main reason for this decentralized operation is the fact that the solution for soil contamination is often found in spatial planning at a local level. Remediation in combination with building activities is more cost efficient and more accepted by the public.

Funding of the remediation operation is essential. The Dutch government has funded the operation with on average an annual budget of 100 million euro over the last two decades (it is an extensive budget but at the same time as few as 6 euros or 3 glasses of beer per citizen!). This budget is shared among those 41 competent authorities. Furthermore private companies who remediate their historically contaminated sites get a contribution from the government for their remediation costs at an average of 35 % and a maximum of 70%. This budget has survived different political debates over the last years because of a clear foresight of start of the remediation of urgent sites before the year 2020.

A new transition in the soil policy became apparent in the first decade of this century. From a political perspective there was a need to focus on remediating urgent sites. It is difficult to explain to the society that so many years after the pollution was caused there still are unacceptable risks at numerous sites. At the same time on a broader perspective there is a trend to integrate sectorial legislation on the environment and spatial planning. Environmental legislation consists of dozens of laws and hundreds of regulations for land use, residential areas, infrastructure, the environment, nature and water. Each has its own starting points, procedures and requirements. This makes the execution and enforcement of the legislation too complex. Consequently, it takes too long to get projects started.

The Dutch government wants to make a legal framework with more flexibility for the competent authorities and will combine the laws on the environment and planning in a single Environment & Planning Act (foreseen in 2018). The Act will replace 23 existing laws, including the Water Act, the Spatial Planning Act and the Soil Protection Act.

Through this new Environment & Planning Act the Government wants to improve links between:

- different projects and activities (in the fields of spatial planning, the environment and nature);
- sustainable developments such as locations for wind farms;
- the various regions.

This Act will result in fewer regulations and will reduce the burden of conducting studies. At the same time, decisions on projects and activities can be made better and more quickly. Moreover, the Act is more in line with the new European policy and allows more room for private initiatives.

The aim is that remediation of contaminated sites is fully integrated in the development of brownfields and residential areas. One of the most important preconditions for transferring the Soil Protection Act into the integrated Environment and Planning Act is the approach and remediation of urgent sites. When all urgent sites are remediated sectorial legislation on soil remediation can be withdrawn. After remediating these urgent sites, soil contamination will still be an issue but will be just one of the aspects that have to be taken into account when an initiative for a development is taken. A set of general rules for dealing with contaminated soils in building projects will make a development more predictable in advance.

This paper describes the approach on remediating all urgent sites in the Netherlands in the last 5 years and the coming 5 years (2009-2015 and 2016-2020): the final countdown. Furthermore this paper describes the outline of the soil legislation within the Environment and Planning Act. The paper ends with lessons learned over the past 35 years of dealing with contaminated land.

2. Program 2009-2015ⁱ

In 2009 an agreement was signed by the Ministry of Infrastructure and Environment, the provinces, municipalities and water boards. This agreement marked the start of an unprecedented effort to clean-up all urgent sites in the Netherlands. This agreement aimed at the remediation of all urgent sites with unacceptable human risks by the year of 2015. Furthermore the aim was to identify all urgent sites with unacceptable risks for ecology or migration of contaminants into groundwater also by the year 2015. In terms of finance a budget of 700 million Euro for the period 2010-2015 was shared among the 41 competent authorities for soil remediation.

The agreement did not only focus on action on the urgent sites, it also had the aim to stimulate competent authorities to develop and implement policies for the regulation and stimulus of ecosystem services such as subsurface cold and heat storage in aquifers. This paper only addresses the subject of remediation of urgent sites.

Inventory: project Focus

In the Netherlands we face on the bases of a desk study a workload of 225.000 locations with potential soil contamination. These sites are selected as potential contaminated because of their historical use based upon historical archives, permits, and areal photographic. Actual investigation of these sites is needed to determine if the sites are contaminated and to what extend. In many cases, based upon investigation, it is concluded that these sites need no further action. In some cases however these sites pose unacceptable risks for human health, the ecology or migration of the contaminants in groundwater.

In 2009 a project started called 'Focus'. This project started with the above mentioned workload. Later on all sites were selected with an above average chance to be severely contaminated. For example sites with an historical use as dry cleaner or gasworks were selected and investigated. Other sites, such as sites for storage of building materials, were not selected for investigation because of the fact

that there is a small chance at detecting unacceptable risks at such a site. For asbestos (for example in road constructions) specific programs have been drawn up.

Since provinces and larger municipalities are the competent authorities for soil remediation and private owners have obligations to conduct investigations and remediate their sites, if necessary, close collaboration of all involved authorities is needed to complete an inventory of this magnitude. A team of experts of the government and the different competent authorities was formed to stimulate and support provinces and municipalities in their inventory program and to monitor the progress. This team is called the Program Management Team.

This resulted in 2011 in a combined list of approximately 400 urgent sites with unacceptable risks for human health. Unacceptable risks for humans occur when indoor air concentrations of contaminants exceed limit values or when humans are over-exposed to contaminants as a result of ingestion (hand-mouth behaviour) and food consumption. Contaminated groundwater used for human consumption is defined under the risks for migration of the contaminants in groundwater.

FIGURE 1 Sites with unacceptable risks for human health

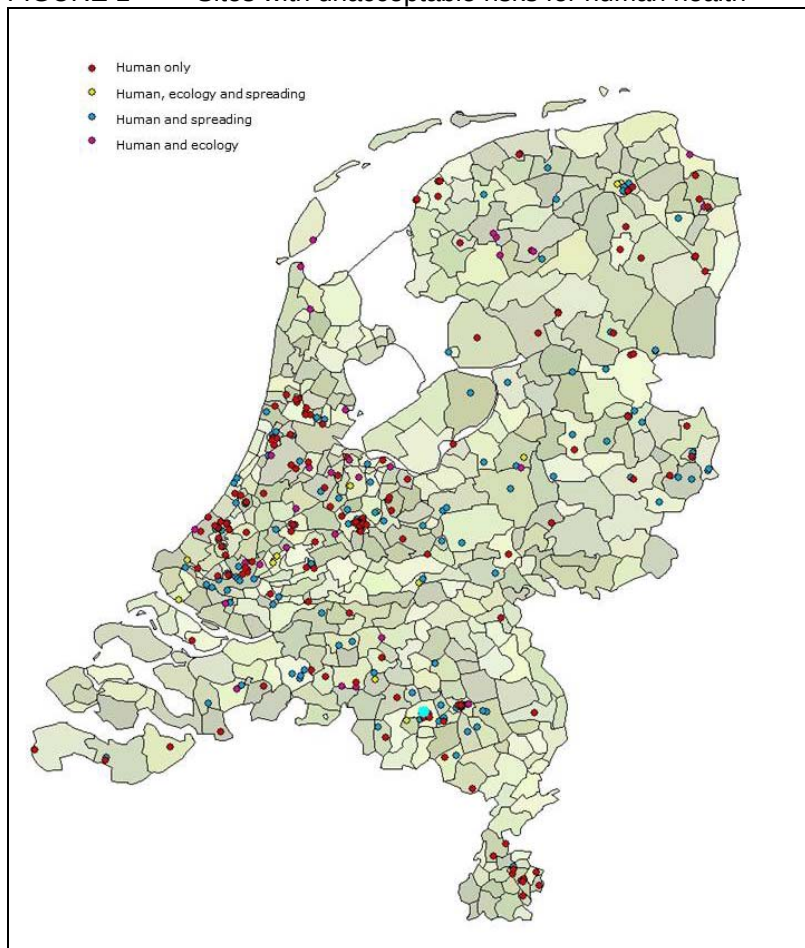


Figure 1 depicts the situation of all locations with human risks in the Netherlands in 2011.

Furthermore the inventory also resulted in 2013 in a list of approximately 1600 urgent sites with unacceptable risks for the ecology (200) or migration of contaminants in groundwater (1400).

Prioritizing the sites with risks for humans – the final countdown

The 41 competent authorities for soil remediation have drawn up programs for the remediation of sites with unacceptable risks for humans. About 50 % of these locations the authorities have to finance these remediation's for themselves because of public ownership or because the owner has no means of funding the remediation. For the other half of these 400 locations existing private owners/polluters have to pay for the remediation. For these sites private owners can be forced to remediate their location within a period of 4 years. Private owners can get a contribution from the government of about on average 35% (maximum 70%) of the total costs for remediation.

The Program Management Team has been monitoring the progress of these 41 different programs in order to assess the progress of the overall goal to remediate all urgent sites with unacceptable risks for humans by the end of 2015. Table 1 depicts the progress over the period 2011-2014.

Time	Finished	Countdown
Jul. 2011	0	404
Jul. 2012	98	306
Jan. 2013	39	267
Jul. 2013	38	229
Oct. 2014	48	181

Table 1: The final countdown for sites with human risksⁱⁱ

Table 1 might suggest that progress is insufficient (50-100/year) to address all urgent sites with unacceptable risks for humans before the end of 2015. More detailed information over the remaining 181 locations indicates that for 90 locations remediation is already in progress and will be ended before the end of 2015. For just 24 locations remediation before the end of 2015 is uncertain. For these locations financial or legal issues are the bases of delay until 2016.

Overall the program is a success. Sites with unacceptable risks are prioritized and the countdown is almost completed for sites with unacceptable risks for humans. This success has to be attributed to the following key-factors:

- Decentralized operation. The local approach towards businesses and landowners is more successful than a central approach because of the existing network structure. Decentralized operation also builds capacity.
- Funding. The count-down is conducted in a period of financial-crisis. Building activity was low, lifting along with urban development was very hard, therefore funding of remediation projects was essential for the progress.
- Collaboration, knowledge transfer and monitoring. A decentralized operation breeds specialists in different organisations. Train the trainer programs have proven to be very successful. It is also evident that not every program of each individual competent authority is conducted at the same speed and success. Collaboration in terms of knowledge transfer, monitoring and benchmarking is needed to keep everybody focussed on the goal of remediating these locations. The formation of the Program Management Team has proven to be a strongpoint in the operation.

3. Program 2016-2020ⁱⁱⁱ

The inventory of other urgent sites resulted in a list of 1600 urgent sites with unacceptable risks for ecology (200) or migration of contaminants to the groundwater (1400). So human risks with top-priority are dealt with, groundwater contamination still is a top-priority due to the implementation of the EU Water Framework Directive and Groundwater Directive. Groundwater contamination is more complex and often too costly. Therefore the approach in remediating the source and managing the plume of the contaminants on an area based approach is often advised. An area based integrated approach requires also to incorporate other interest such as heat and cold storage in the aquifer. Groundwater as a resource for drinking water and (food and drink-)industry is a very important economic factor, therefore the 2009-2015 program needs to be extended.

The Dutch government, provinces, water boards, municipalities have drawn up a new agreement and a 5 year program with the aim of dealing with these 1600 locations and establishing new legislation for the period after this final countdown. These parties involved are aware that the soil and the subsoil make an increasingly important contribution to the achievement of societal goals (the provision of energy, the provision of drinking water, groundwater reserves, agriculture, cultural history, nature and climate mitigation and adaptation). They want to increase this contribution as much as possible in an innovative manner, taking into account the natural qualities of the soil and water system and the (targeted) surface and underground functions. The parties involved intend to work towards a further development to achieve sustainable management and use of the soil and subsoil.

For the period 2016-2020 a budget of 550 million euro is provided by the government and shared among the 41 competent authorities .

Urgent sites with unacceptable risks for the ecology

When a location has a large surface, contaminants are widely spread and the location is situated in an area where there is interest in developing nature or the location is part of the national ecological structure, remediation of a location can be urgent for reasons of good ecology. A special risk assessment has been developed by the RIVM. In the program for 2016-2020 the competent authorities have to deal with some 200 urgent sites with unacceptable ecological risks. For about 100-150 of these locations it is expected that further investigation will lead to the decision not to remediate these sites. Remediation in a natural environment can damage the habitat of species of interest who have settled in on contaminated sites. If for example a colony of badgers has settled in on an abandoned site, remediation of the site is prohibited because of the fact that badgers are a protected species.

For about 50-100 of these urgent ecological sites remediation is foreseen in the period 2016-2020.

Urgent sites with unacceptable risks for migration of contaminants to groundwater.

Not all location with an impact on groundwater quality are selected as urgent. A set of criteria is issued by the government in order to identify the most urgent locations. The set of criteria is as follows:

- The volume of affected groundwater is over 6.000 m³ and the annual increase in volume is over 1000 m³
- There is a layer of contaminants on top or below the aquifer

- The contaminated groundwater is located nearby a vulnerable object for example within a protected area for water supply for human consumption or a protected area in accordance with the EU Water Framework Directory

Given these criteria approximately 1400 locations have been selected as urgent for unacceptable risks for migration of the contaminants in groundwater by the 41 competent authorities.

A large part of these locations will not be remediated on the basis of a site by site approach. Due to the fact that they are all historical contaminations, a lot of these locations are situated in the vicinity of each other and plumes of contaminants have mixed in the saturated zone, especially in urban areas. Therefore a more area based and integrated approach is foreseen for a lot of these locations. An area based and integrated approach is more complex because more stakeholders are involved. It takes a lot of effort from local authorities to interest all stakeholders to participate in an area based approach. The common ground however is that collaboration within a logical area will be more cost-effective. A lot of knowledge and experience on this point has been built up for example in the CityChlor project.

The aim of the new agreements is that all sites with urgent (unacceptable) risks for migration of contaminants into the groundwater will be remediated or under control by the end of 2020. Competent authorities face the challenge to decide whether an integrated area based approach is suitable for their problem sites. Moreover the competent authorities have to stimulate private owners and companies to start remediating before 2020. All competent authorities are drawing up plans for the upcoming period in order to comply to the new agreement. A new Program Management Team will be formed to stimulate and help competent authorities and to monitor the progress of the goals of the agreement.

Private companies have contributed to the remediation of a lot of contaminated sites over the last 35 years. Special programs have been carried out for filling stations, drycleaners, railway stations and gasworks. Further and intensive collaboration with private companies is foreseen for the coming period. The possibilities for receiving a contribution from the government for private investment in soil remediation will be modernized. Some administrative burdens will be dissolved and the possibilities for receiving a contribution for an area based approach will be widened. Private companies also have a great interest in clean groundwater as a source for their production. The parties involved in the agreement and private parties will investigate the possibilities of a contribution from companies who have interest in clean groundwater in the costs for managing the groundwater plumes.

4. New legislation

When all urgent sites with unacceptable risks are remediated or under control, soil remediation of the other less contaminated sites can be integrated in the regular spatial planning processes. In the future remediation of contaminated land in the Netherlands will no longer be a stand-alone process but will only occur as a side effect of developments or in case the ecosystem functions of the groundwater are under pressure. Therefore the Soil protection Act will be withdrawn in 2018 and legislation on contaminated land will be incorporated in the new Environment and Planning Act.

The Environment and Planning Act is now under construction, but some broad outlines for soil already exist:

- Most important is the fact that the new legislation will not alter the way soil protection is regulated. There is no right on pollution so that new contamination will remain forbidden. As much as possible generic rules for soil protection will be incorporated into the Environment and Planning Act.
- For the remaining historical contamination the site specific approach will be transformed into a development based approach. Combine different interests! As long as there is no development no actions have to be taken. If a location is historically contaminated the competent authority can consider to advise the owner of the location to take specific precautions (for example no consumption of vegetables from the garden).
- If a development is planned the initiator needs to assess the quality of the soil. The initiator will be facilitated with a register of conducted investigations and soil quality maps in order to reduce the burden of investigations. If the soil at the location of development meets the standards for the future function, no further (soil) action is needed.
- When the soil quality does not fit for the future function remediation is needed. A set with generic rules about risk assessment and remediation will be incorporated into the legislation. No specific permits are needed for remediating. Therefore remediation will be carried out as a natural part of the development.
- The Environment and Planning Act provides the competent authorities with integrated instruments. For example an integrated long term perspective for the area drawn in a plan. With these instruments the contribution of soil and subsoil to societal goals can be addressed.

5. Lessons learned

Since Lekkerkerk 35 years have passed. In these years a lot of sites have been remediated and a lot of knowledge has been generated. The end of an era of remediation is in sight, the countdown is nearly completed. What can we learn from the Dutch approach? Some key success factors are already mentioned. The most important lessons learned are:

- A long term political and financial commitment is needed to solve the problem of contaminated land
- A strict preventative policy and legislation is essential. This is also beneficial for the industry because prevention measures are cheaper than cleaning up.
- It takes more than a generation to build up knowledge and experience and complete a thorough inventory of the magnitude of the problem of contamination land.
- Decentralized operation is an essential factor in the Netherlands, because of the buildup of capacity, the relation to spatial planning and the close connection of the authorities with the owners of contaminated land
- Focus is needed on the countdown of top-priority locations in order to incorporate soil remediation in the normal process of redevelopment of urban areas and brownfields.
- The need for integrated legislation on the Environment and spatial planning has been a great stimulus for the focus on remediating the contaminated locations with urgent, unacceptable risks.

The Netherlands have a broad base of experts on dealing with contaminated land. For the upcoming 5 years these experts do have a home market and will contribute to the final countdown. After the period 2015-2020 these experts will find their way in multidisciplinary teams dealing with issues on

environment and planning. For foreign countries who still have a large task in dealing with contaminated land these experts could be a welcome source of knowledge.

ⁱ Convenant Bodemontwikkelingsbeleid en aanpak spoedlocaties 2010-2015

ⁱⁱ Midterm review 2013, Doorpakken

ⁱⁱⁱ Convenant Bodem en ondergrond 2016-2020