Governance strategies for finalizing contaminated areas

Dr. ir. Geert Roovers is professor of applied science at Saxion University of Applied Science, and consultant at Antea Group, the Netherlands.

Ron Nap Msc. is strategic advisor at the Municipality of Apeldoorn, the Netherlands, and secretary of the Dutch Taskforce for finalizing contaminated areas.

1 Renewed attention for contaminated areas in the Netherlands

In the eighties and nineties of the previous century large soil cleaning operations of contaminated areas were carried out in the Netherlands. Decades of industrial and agricultural pollution had put human health in these areas at stake. While initially the soil was totally cleaned, due to financial reasons later on a more functional approach was adopted. Such a risk-based approach provided an objective way to mitigate risks and provided a rationale to focus society's limited resources at the most serious and urgent problems (Swartjes, 1999, Smith, 2019). In this approach a risk assessment was used with a focus on the desired functions at that area. Some pollution remained and was isolated and monitored ('controlled') to limit human risks within an acceptable level. Due to this approach financial investments were limited without hindering specific desired land-use. In the Netherlands at least 550 of such locations still exist, but many more are counted on (estimated till maybe 2.000 locations, Antea Group, et. al., 2018, Witteveen+Bos, 2018). Because isolation measures, monitoring and administration of these locations have institutionalized, without any notice more than some 10 million of Euros are spend every year on these locations. And as these locations are set up to be there 'for ever', this is a hidden burden for future generations, ecologically and economically.

Due to recent developments however, in the Netherlands this tide is changing (Staatssecretaris van Infrastructuur en Milieu, 2015, Antea Group, 2018). Soil management tasks are decentralized from the national to local level, including budgeting. This causes momentum for reconsideration of the yearly investments. Furthermore, on several locations constructions are more than two decades old, and prone to replacement. This asks for substantial investments which are another trigger for reconsideration. This goes hand-in-hand with fast growing claims on urban space, due to issues such as the switch to renewable and sustainable energy, anticipating climate change and ongoing urbanisation (see for example Chakrapani and Hernandez, 2012). These claims make redevelopment of these contaminated areas attractive again, reconsidering a new lay-out or added functions. This redevelopement focus is strenghend by upcoming remediation approaches based on sustainability and even circularity (Smith, 2019). Finally, new techniques on remediation of contaminated soils make new solutions possible and/or financially more attractive than in earlier decades (see for example Bardos et.al., 2016, Aqua Con Soil, 2019). This is why Dutch governments (national, regional and local) have agreed to downsize these controlled contaminated areas and stimulate owners and land managers of these areas to start new reconsiderations.

Yet, reconsidering downsizing these contaminated areas doesn't come easy. Several barriers prevent real downsizing from happening, even in these economic prosperous times. This article explores these barriers and shows possible strategies which can help owners and land managers to come to downsizing and even finalizing their contaminated areas. It describes four cases in which different strategies have helped to come to new land use and/or downsizing the contamination. In these areas new value is created. This article is based on research done in 2017 and 2018 by a consortium of consultants and research institutes (Witteveen+Bos, 2018, Antea Group et. al., 2018).

2 Background

Problems that hinder finalizing contaminated areas

Literature shows several problems which hinder redeveloping and finalizing contaminated areas (e.g. De Sousa, 2003, Tritel & AMRP, 2012 and de Zeeuw, 2018). Some authors describe problems referring to land redevelopment in general, some refer problems with contaminated areas in particular. In essence these problems have to do with (1) insufficient information about the contamination, soil and impacts ('black box') in and around the area, leading to (2) additional costs and risks, (3) fear for health problems and legal claims, (4) a negative image of the area, which hinders stakeholders, residents and investors, and (5) the abundance of more easily accessible ‘greenfields’. Other problems hindering finalizing in the Netherlands can be found in inconsistent municipal policies, shredded ownership and lengthy processes (de Zeeuw, 2018). Based on this, current limitations on reconsidering contaminated areas in the Netherlands were researched based on interviews and expert judgement (Antea Group et. al., 2018, Witteveen+Bos, 2018). They found four principal limitations for owners and land managers for reconsidering their current way of management in the Netherlands. First, their way of working is institutionalized. Due to yearly available budgets and a stable internally focused management organization, triggers for reconsiderations lack. Secondly, the spatial situation is institutionalized too. As the isolation and monitoring measures are already for years - and sometimes even decades - in place, residents, stakeholders and spatial developers are used to the site location as it is, including its limitations. Some residents even cherish the situation, because the isolated polluted site prevents further economic development of the place. Furthermore, finalizing the measures to isolate and monitor pollution can lead to risks. What has happened in the past decades within the isolated polluted soil, is often badly known. Thus, getting into action is unattractive for administrators and politicians. Finally, due to decentralization an overarching strategy on a national-wide reconsideration, lacks.

Finalizing contamination asks for interactive, communicative and learning approaches

In the eighties of the previous century large contaminations were found on new construction grounds and existing locations. This was the trigger for a large cleaning operation which lasted at least until the nineties and which is actually still going on (see for example Vegter, 1995, Braams e.a., 2013, Bannink, 2018). According to the urgency of the problem and the insights in planning in these years, the cleaning operation was performed as a single-issue and single actor operation. It had the characteristics of a central controlled operation. The focus was on environmental soil cleaning, and doing this as efficient and quick as possible. The main problem was finding the polluter and make him pay for the operation. The urgency of the pollution issue and abundance of budget made this central, single-issue and single-actor approach possible. Meanwhile, research showed that such a single-issue and single-actor approach had reached it limits. Intertwinement of issues, dependencies of actors and a more and more critical public made the world of planning complex (see for example Hisschemöller 1993, Kickert, Klijn en Koppenjan 1997, Lindblom en Woodhouse 1993, Sabatier and Jenkins-Smith 1999, Rothmans, 2005). In such a complex world a hierarchic, single issue, project focused approach encountered difficulties, such as stagnation in planning, resistance by the public and deadlocks in decision making. It gave birth to the rise of new planning approaches, under names like interactive planning, process management and management of networks (see for example Klijn en Koppenjan, 2004, de Bruijn et. al, 2007, de Zeeuw, 2018). Main drivers in these new communicative approaches were the use of multi-issue planning and stakeholder involvement. In these approaches windows of opportunities are important triggers for progress. Van Arkel (2012) analysed brownfield redevelopment – a way of finalizing contamination in these areas - and stated that this takes place in complex networks of actors, which can have contradictory interests and views on the issue. The multi-faceted character of redevelopment of brownfields crosses policy domains (environment, safety, economics, spatial planning). This can lead to lengthy processes and growing uncertainty. From this, one can state that finalizing remediation could even be seen as a ‘wicked problem’, first defined by Rittel et al. (1973). Such a ‘wicked problem’ asks for an interactive, learning approach (Grin et al., 2010, Levin et al., 2012, Metze & Turnhout, 2014). Thus, finalizing should follow interactive, communicative and learning approaches.

New approaches of remediation

Parallel to this need of new approaches, the rise of new remediation approaches can be seen, such as approaches using new techniques and approaches with a focus on sustainability and circularity (e.g. Breure et al., 2018, Smith, 2019). Upon recently remediation was seen as a sustainable act in itself, but today negative effects of remediation are acknowledged (Surf-UK, 2010, Vegter et. al., 2003). The rise of circular approaches can be also be seen in the need to redevelop contaminated land within the urban areas, in order to prevent urban sprawl and to increase the future development of urban cities (Chakrapani and Hernandez, 2012). Such land recycling has become a major concern – for example - in European regional policies (European Commission, 2011). An important contribution to reaching this goal is the regeneration of contaminated areas (Maring et al., 2013).

The rise of professional asset management

Another relevant development is the rise of professional forms of asset management, even in soil management. For example, the Municipality of Rotterdam has introduced asset management in its daily management of soil to achieve a sustainable, circular and efficient use of it (Maring, 2016). The basis for this rise lies in the change of focus from investing in new assets to the use, replacement and maintenance of existing assets (Herder and Wijnia, 2012). This is strengthened by the already mentioned complexity, the decrease of public budgets and public calls for more efficiency, more transparency and a more user-orientated way of working by public managers (Moon et al., 2009, Herder and Wijnia, 2009, Michele and Daniela, 2011).

Asset management focuses on the lifecycle of assets, and puts investments in assets in their life-cycle perspective. It considers the performance of the assets within the context of their risks and costs. In addition to this more business-like approach of asset management, Roovers and van Buuren (2016) discern a more public-orientated approach of asset management, aimed at adding public value to the assets. To deal with this, Roovers and van Buuren developed four styles of asset management. On one side of the spectrum monofunctional asset management is defined, focused on an exploitative and closed style of asset management – comparable with a business-like approach of asset management. On the other side of the spectrum, they define a learning style of asset management, in which an open and explorative way of working is adopted. Roovers and van Buuren conclude that these styles are effective in different situations, but that growing societal complexity and uncertainties more and more ask for a learning asset management strategy.

Strategies for finalizing contaminations

From these theoretical notions one can state that reconsidering and subsequently finalizing contaminated areas should follow an interactive, communicative and learning approach, with the use of multi-issue planning and stakeholder involvement. And that the dominant asset management strategy of the soil and land managers should be based on an open and explorative strategy. In general, concepts like interactive planning and process management provide strategies to deal with such multi-actor and multi-sector problems. A multi-goal focus, with stakeholder and community involvement and an open, transparent and safe way of working are key-factors in this, windows of opportunities are triggers for fundamental progress (De Sousa, 2003, Klijn en Koppenjan, 2004, de Bruijn et. al, 2007, de Zeeuw, 2018).

Some authors have specifically developed strategies for redeveloping contaminates areas. Bardos et. al. (2018) for example discern soft and hard re-use of these areas. Hard re-use is based on built constructions or infrastructure. Soft re-use is based on intended temporary or final re-use of brownfield sites which are not based on built constructions or infrastructure. While historically there has been a preference for hard redevelopment, soft re-use is already used in a number of countries (Sarni 2009, Thornton et al. 2007). The European CABERNET project categorised brownfield sites into three categories, which each need a different strategy for redevelopment (Ferber, 2006, Tang and Nathanail, 2012): (A) Sites which are economically viable and the development projects are driven by private funding. (B) Sites that are on the borderline of profitability. These projects tend to be funded through public-private co-operation or partnerships. (C) Sites that are not in a condition where restoration can be profitable. Their restoration relies on mainly public sector or municipality driven projects. Public funding or specific legislative instruments (e.g. tax incentives) are required to stimulate restoration of these sites. Antea Group et. al. (2018) discern a fourth category: sites were redevelopment is economically not profitable, but from a remediation perspective they are. Ringers (2018) refers to temporally use as an solution against deterioration and decay of areas which are not prone to finalizing or redevelopment yet.

Grimski and Ferber (2001) state that successful redevelopment of contaminated areas needs a combination of environmental, spatial and urban planning approaches. Van Arkel (2012) refers to Edelenbos & Klijn (2009), Van Buuren et al. (2010) and Teisman et al. (2009) in discerning two different strategies for redevelopment of contaminated areas. A conservative strategy draws stable and relatively closed boundaries between the project and its related context. Actors try to reduce complexity by keeping the process structured, narrowly demarcated and by keeping control. Such a conservative strategy aligns with the closed, exploitative asset management, as describes before. In a more adaptive strategy actors are less strict on demarcating the project and do not isolate the project from its context. The conservative and adaptive strategy both have their pros and their cons. The conservative strategy is said to be oriented at quick and substantive progress. The drawback is that overall support to the project can be lacking (Edelenbos & Klijn, 2009). The adaptive strategy can result in wide supported solutions, but the process can be costly and time consuming. Such an adaptive strategy aligns with the open, explorative asset management strategy, as describes before.

To sum up

One can state reconsidering and subsequently finalizing contaminated areas should follow an interactive, communicative and learning approach, with the use of multi-issue planning and stakeholder involvement. And that the dominant asset management strategy on these locations should be based on a learning, open and explorative, strategy. Strategies for finalizing contaminates areas can thus be characterised by several characteristics:

- A focus on redevelopment, working towards a new situation vs. a focus on optimizing the current situation;
- A more conservative and closed strategy vs. a more open and adaptive, learning strategy;
- The rate of involvement of communities and stakeholders;
- A multi-issue approach, based on the problems hindering redevelopment. Such an approach should encompass the environmental behaviour and risks, spatial developments, social issues and image.
- The use of windows of opportunities;
- The use of (smart combinations of) hard and soft re-use, and final and temporal use;
- Organisational measures that tackle institutionalization of a closed way of working.

3 Four cases of reconsidering contaminated areas

In the foregoing paragraph some important factors that hinder reconsidering and downsizing contaminated areas, were identified. In addition some guidelines for successful strategies are found. In the Netherlands there are cases where reconsidering and downsizing was done successfully. In our research, we investigated these cases to gain insight in successful strategies to downsize or even finalize the polluted situation. This paragraph briefly describes the essentials of four of these cases, based on Antea Group (2018) and Debast et. al. (2018).

Dagra-area at Bunschoten

Dagra Bunschoten is a location at which in past decades pesticides were produced. When pollution around the area was discovered and a cleaning operation started, the location was embedded in agricultural polders. In 1985 the soil was cleaned by removal of the polluted soil until 5,75 m –mv. In addition, a severe groundwater cleaning operation was started. In 1989 it was found that the removal of polluted soil hadn’t been done deep enough: deeper into the existing peat layers (6,5 till 7,5 m -mv) pollution with benzene was still there. To deal with this, the cleaning of groundwater was changed into geohydrological isolation of the remaining pollution. In 1997 the area was raised by deposing clean soil. New houses were built on top of it. The groundwater subtraction and water cleaning installation were placed underground.

In 2012 the manager of the groundwater isolation temporarily stopped the groundwater subtraction. This gave the opportunity to gain new insights into the behaviour of the local water- and soil system and into new possibilities for more efficient isolation – and maybe reduction – of the remaining pollution. This learning strategy was due to personal initiatives. Based on these new insight, the manager is now developing new ways to isolate and reduce the groundwater pollution.

EMK-area at Krimpen aan de IJssel

The so called EMK-area at Krimpen aan de IJssel long was a location with isolated pollution where nothing happened. The most important barriers for action were (1) legal disputes about claims of damage, pollution and bankruptcy of the former owners, (2) the technical complexity of the pollution and isolation measures and (3) the bad image of the area due to its long history of pollution. Redevelopment of the area came into sight when a ‘window of opportunity’ occurs: (1) unexpected remaining budget at the national ministry, (2) a new national deal about finalizing contaminated areas and (3) a technical inspection of the isolation measures which showed severe damage of the pile sheet isolating the pollution. These triggers recently brought the manager of the area to reconsider the isolation measures and use the budget for restoring the pile sheets to help new redevelopment within the current economical high tide. In this case the manager initiated a strategy for redevelopment of the area and redesign of the isolation measures triggered by a window of opportunity of budget and need for reinvestment.

Cebeco area

At the Cebeco-area, a former agricultural production plant, a new housing project and isolation of pollution gone hand-in-hand. The isolating measures and pollution are invisible, covered by a mount. The manager of the area – a commercial enterprise – realized that they should manage the pollution until ‘infinity’. But, changing interests made former economical calculations obsolete. Together with a need for replacement of the initial pumping installation, this made the manager reconsidering the technical measures and way of management, leading to more efficient measures and way of management. In this an businesswise way of thinking leads to redesign of the existing management measures. Furthermore, the manager seeks collaboration with universities to use new knowledge in remediation techniques. Optimization of his commercial way of working seems the main strategy of the area manager.

De Ceuvel, Amsterdam

De Ceuvel in the north part of Amsterdam was a shipping-wharf in which large contaminations remained after the departure of the shipping industry. Due to economical depletion, redevelopment and cleaning was not economical feasible, and the lack of interest in this part of the municipality of Amsterdam made redevelopment off-radar for project developers. Within the economic crises of 2007 and further, the municipality of Amsterdam started a bottom-up experiment and initiated a competition for new ways of using and developing the area. The price-winning coalition of architects and artists came up with a plan to use old houseboats: they placed them atop the polluted soil, connected with scaffolds. The boats were rebuild into sustainable working places. Around the boats remediation vegetation was planted to clean up the soil. Around the area events and catering now make the place thriving and attractive for lots of people. The area has turned into an attraction in which new ways of working, events and remediation of the soil reinforce each other in an innovative and sustainable experiment. In this case we see an innovative, learning bottom-up experiment leading to new ways of (re)developing and (re)use of contaminated areas.

4 Comparison and analysis of the cases

The researched cases all show that reconsideration of existing isolated contaminated areas is attractive and offers new possibilities. This reconsideration has in some cases led to reduction of the necessary measures. In other cases however this reconsideration kept the current measures unchanged, but led to new value on the locations due to a different use. And in line with the theoretical notions, three aspects appear to be crucial: initiative, urgency and strategy. In the next part these aspects are analysed. Table 1 shows the characteristics of the used strategies within the cases.

Characteristics	Dagra	EMK	Cebeco	De Ceuvel
Redevelopment vs. optimization	optimizing	redevelopment	optimizing	Redevelopment
Closed vs. open, learning	open	open	closed	open
Stakeholder involvement	no	yes	no	Yes
Multi-goals approach, including environmental risks, spatial developments, social issues and image	No, focus on environmental risks	Yes	No, focus on environmental risks and financial optimizing	Yes
Use of windows of opportunity	Yes	Yes	Yes	Yes
Hard, soft, final or temporarily use re-use	- /Temporarily	Not yet known / Final	- / Final	Hard and soft / Temporarily

In all cases organisational measures to breach institutionalisation are not researched. Only at De Ceuvel it is known that new ways of working are chosen because of the economical low tide period. In all cases there is somebody that takes the initiative to reconsider the current measures that isolate and monitor the remaining pollution. This initiative is sometimes taken because there is a clear trigger or urgency to get into action (window of opportunity): at EMK and Cebeco for example, financial investments are such a trigger. In other cases reconsideration follows individual motivation of involved public professionals (Dagra, De Ceuvel). In the cases it can be seen that the trigger for reconsideration often comes from the need for new investments, replacement, but also from more external developments, such as new ways of working in economical low tide periods (De Ceuvel), or the urge for redevelopment in economical high tide periods (EMK). In all areas a potential to reconsider current measures and management is there. These triggers are stimulated by experimenting, learning and new technical developments.

In all cases the used strategies collide with the theoretical notions that finalizing contaminated areas should follow a communicative, multi-issue, open and explorative approach. From these notions eight different possible strategies are discerned, which are often applied in combination with each other to be successful:

1. ***Temporary use***: this improves the image of the area, breaks through the spatial institutionalisation of the area and gives politicians a chance to position the area in a positive way.

2. ***Placemaking***[1]: is focused on addressing the positive qualities of an area as a brand. It helps to break through the spatial institutionalisation and gives politicians a chance to position the area in a positive way. Temporary use and placemaking reinforce each other.

3. ***Redevelopment***: is made possible by anticipating on urgent spatial issues, such as climate change, urban transformation an climate change. It helps to break through the spatial institutionalisation and gives politicians a chance to position the area in a positive way. Temporary use and placemaking can initiate such a successful redevelopment. Sustainable and circularity can be drivers for such a strategy.

4. ***Redesign***: new insights and techniques make new designs of remediation measures possible. It gives managers the opportunity to reduce the yearly costs and possibly end the contamination in the long turn. Sustainable and circularity can be drivers for such a strategy.

5. ***Experimenting***: make it possible to experiment with and learn about new techniques on remediation. It can be a stepping stone to redesign and temporary use. It helps politicians to positively frame the area and gives new insights in the 'black box' and real risks of the contaminated area.

6. ***Optimizing current management:*** in cases where redevelopment or redesign is yet out of sight, optimization of the current management offers opportunities. Professional asset management can help to reduce costs and risks.

7. ***Continuing***: in cases where redevelopment or redesign is yet out of sight, and optimization of the current management doesn't seem profitable, continuation of the current management can be a conscious choice. It gives the opportunity to bring the area into renewed attention of politicians and inhabitants.

8. ***Adjust the management organization:*** changing tasks, roles and responsibilities of the current management organization can cause a new organizational dynamic which can breach the possible lock-in of the management. Subsequently it can be followed by (a combination of) the above mentioned strategies.

[1] Following literature on place-making, such as Pierce (2010): 'Place-making is the set of social, political and material processes by which people iteratively create and recreate the experienced geographies in which they live'.

5 Conclusions

In this article strategies for finalizing contaminated areas are researched. In the Netherlands, there are four principal limitations for owners and land managers for reconsidering their current way of management. First, their way of working is institutionalized. Second, the spatial situation is institutionalized too. Third, getting into action is unattractive for administrators and politicians. Finally, due to decentralization an overarching strategy on national-wide reconsideration lacks. In general, reconsidering and subsequently finalizing contaminated areas should follow a more interactive, communicative and learning approach, with the use of multi-issue planning and stakeholder involvement. The dominant asset management strategy on these locations should be based on a learning, open and explorative, strategy. This strategy can subsequently be characterised by (1) a focus on redevelopment or a focus on optimizing, (3) involvement of communities and stakeholders, (4) a multi-issue approach, that encompasses the environmental behaviour and risks, spatial developments, social issues and image, (5) the use of windows of opportunities, (6) Smart use of (combinations of) hard and soft re-use, final and temporarily use, and (6) organisational measures that tackle closed institutionalization.

From this eight different possible strategies can be discerned: temporary use, placemaking, redevelopment, redesign, experimenting, optimizing current management, continuing and adjusting the management organization. Success is embedded in a smart way of combining these strategies. Furthermore, all cases and literature show that the role of somebody that takes the initiative to reconsider, to start discussions and to use momentum created by windows of opportunity, is crucial to come to finalizing contaminated areas. This follows the notions developed in the field of area development and process management. In this initiatives only come to real action when they are met with a potential at the area and an urgency to come into action. The cases in this article show their potential, and often an economical, financial trigger to come into action.

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