

## Land or lakes

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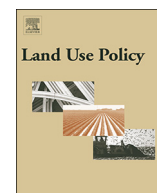
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# Land or lakes: Gravel excavation in Dutch spatial and resources policies through the lens of sustainability developments, 1950–2015

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## ABSTRACT

Excavations can cause tension between local spatial interests at excavation sites and the demand for national resources. Policymakers have to weigh up the choices in sustainability trade-offs between the geological and geographical aspects. This shows in the developments of resource and spatial policies. A novel historical approach investigates the long-term sustainable dynamics of gravel excavation and land use policies in the Netherlands in a transnational context, assessing the roles of local, national and international actors. Amid the gradual merging of land use and resource policies, this article reveals how local spatial and sustainability aspects prevailed and resulted in offshoring a geologically abundant natural resource and its connected sustainability issues.

## 1. Introduction

Governance and contestations between urban, infrastructural, agricultural and nature development dominate current debates about land use in the Netherlands (Arts et al., 2016; Meyer, 2016; Van der Cammen and De Klerk, 2012). Yet, issues concerning surface excavations are hard to find in the current land use plans. There was certainly little sign of these issues in the Dutch government's 2004 Spatial Development Policy, which merged resource and spatial policies for the following 10 years. Despite wide availability of sand and gravel, in recent decades the Netherlands has become largely dependent on imports for its building materials (Van der Meulen, 2005). This is a remarkable situation in light of the growing concerns about availability and sustainability of mineral resources, including building materials. The increasing Dutch dependence on foreign resources seems symptomatic for a broader European development (European Union, 2008, 2014; Weisz, 2006). The shift to reliance on imports not only raises questions about the dynamics between resource planning, progress in construction and spatial planning. It also questions how these dynamics

have become entangled with the sustainability goals that are omnipresent in current spatial policies (Bovet et al., 2018; Boggia et al., 2018; Sieber et al., 2018). This triggers questions such as what drove these changes in land use and excavation policies and which sustainability issues were involved.

The development of land use policies is a dynamic, long-term and multi-actor process of accommodating contemporary spatial demands. Land use decisions are prone to lock-in effects (Hommels, 2005). Choices made in the past influence today's options, and have a long lasting impact on future developments. Former goals have therefore also influenced the current and future possibilities for land use and resources. Studying the history of excavation and land use will help us understand how goals and decisions in the past are still affecting the sustainability of resources and land use today.

## 2. Methodology

Excavation and land use policies have been shaped by many different actors. The methodological framework to study this complex

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multidimensional development draws from process theories applied in humanities studies (Pettigrew, 1997; Poole et al., 2000; Abbott, 2001). Historians of technology apply evolutionary theory, sociology, globalization and science and technology studies in order to analyse the underlying processes (Schot et al., 2010; Grin et al., 2010; Van der Vleuten, 2008; Van der Vleuten and Feys, 2016). This article combines two history of technology approaches to explain the long-term effects of socio-technical systems such as excavation and land use planning. The first approach helps to unravel the complex multi-actor dynamics, and how these affect sustainability i.e. the trade-offs between economic, social and environmental issues. The second approach draws our attention to the broader governance setting, questioning local, national and international interactions.

### 2.1. Multi-actor dynamics and sustainability trade-offs

This article is derived from a research project Historical Roots of the Dutch Sustainability Challenge (HIRODS) studying historical developments through the lens of sustainability. The project has created a novel approach combining historical transition studies with monitoring sustainability developments. (Lintsen et al., 2018).

Transition studies analyse the processes of co-constructing economic, cultural, technological, ecological and institutional sub systems. Applying a multi-level perspective, they analyse the interference of practices, structures, and long-term trends that shape the construction and governance of technological systems. The first point of departure is that socio-technical practices and their institutional and spatial embedment are shaped by once dominant problem definitions and value orientations. When new problems and value orientations become dominant, these practices and their structural embedment need to transform accordingly. Transitions can occur when novel practices emerge, or fundamental and structural changes in practices coincide with long-term trends and reinforce each other dynamically over time (Schot, 1998; Rip and Kemp, 1998; Schot and Geels, 2007; Grin et al., 2010).

The next step is a framework that examined sustainability developments to track the historical dynamics. This approach operationalizes the Brundtland definition of sustainability and describe the interrelations between contemporary demand, (current needs), future stocks (next generations) and effects in other regions. These demands are translated into economic, social and environmental issues at regional and national levels. These investigations make it possible to track the actual, intergenerational and transnational sustainability trade-offs between economic, social and environmental developments (CBS, 2014, 2018).

The final point of departure is investigating the sustainability effects across material flows that are at the base of societies economic and material demands. Sustainability impacted various parts of these resource supply chain differently, and these can also change over time. From excavation, via production and usage to disposal, this resulted in different trade-offs regarding sustainability. Production chain analyses of ecological economics and political ecology approaches have shown socio-economic and environmental tension developing between places of extraction, production, consumption and disposal (Conde and Kallis, 2012). The sustainability effects and land use conflicts arising from extraction have been elaborately studied (Hilson, 2002; Bloodworth et al., 2009; Abuya, 2016). These studies however mainly focus on the local implications, the value conflicts, unequal distribution of profits and lack of compensation. This article aims at broadening the scope both stretching the temporal and geographical context.

### 2.2. Transnational history

Environmental economists have pointed at the long-term dynamics and broader geographical implications for supply chains. They studied the offshoring of production caused by increasing environmental

demands. These production replacements could also move sustainability effects across borders (Brunnermeier and Levinson, 2004).

These international aspects of resource chains also imply a need to study local developments in a global context. Local and national characteristics cannot be taken for granted, but need to be part of the investigation. In history of technology, this investigation has created transnational analysis, stemming from globalization studies. These focuses on the interlinkages between local, national and international developments (Van der Vleuten, 2008; Van der Vleuten and Feys, 2016). This literature informs this article, which will thus examine the mutual shaping of excavation and land use in light of local, national and international developments. It questions rather than assumes national interests as the main driver of developments. This is not meant to demean national levels, but rather assess their role in a broader context.

The case to study these transnational dynamics of excavation, supply developments and land use, is geographically limited to Dutch river Meuse valley in the southern province of Limburg. This article highlights the supply of building materials, more specifically gravel applied in concrete. In the second half of the twentieth century, the Meuse valley became the main domestic supplier of gravel. National and local public and political debates about resources and spatial planning are the main sources to perform historical analysis. These discourses can be retrieved from the minutes of Dutch parliament (MoDP), Senate (MoDS), Limburg authorities (MoPL) (Minutes of Dutch Parliament (MoDP) and Senate (MoDS) in digital archives, 2018), policy reports, as well as in trade journals, national and regional newspapers.

The analysis starts in the 1950s, the period of post-war reconstruction and economic growth. In order to understand the historical dynamics at excavation sites in Limburg, the following section presents a brief overview of the increasing demand for building materials in the Netherlands since the 1950s.

### 2.3. The context: increasing gravel demands

From the 1950s onwards, the demand for building materials in the Netherlands was enormous. In the previous decade, the Second World War had damaged or destroyed 500,000 houses, about a quarter of all Dutch dwellings. The North Sea flood of 1953 furthermore inundated 1365 km<sup>2</sup> of land, flooding about 9 percent of Dutch agricultural land and damaging another 47,000 buildings. The enormous housing reconstruction efforts and the construction of dams and flood barriers of the Delta Works boosted the production of building materials in the 1950s. New investments in roads, office buildings, and housing starting in the 1970s propelled the building industry in the 1990s and early 2000s. The demand for building materials kept on growing, with only a temporary drop during the economic crisis in late 1970s and the early 1990s.

New innovative building methods and materials were needed to meet the hugely increased demand. Concrete and pre-fab methods were the technological solutions. Concrete roughly consists of cement (17%), sand (33%), and so-called filling material (50%), which was predominately gravel in the Netherlands. Gravel was furthermore applied in asphalt concrete for building roads.

Together with other raw materials for the construction industry such as sand and clay, gravel represents one of the most substantial mass flows in the Netherlands' economy. In 2005, sand and gravel accounted for approximately 40 percent of all the country's mass flows (Lambert et al., 2013). Geologically speaking, gravel was and is abundant in the Netherlands; exploitable gravel resources in the southern province of Limburg amount to some 150 annual consumption equivalents (Van der Meulen, 2005). However, in the last two decades, national gravel production declined and the Netherlands became increasingly dependent on imports (see Fig. 1).

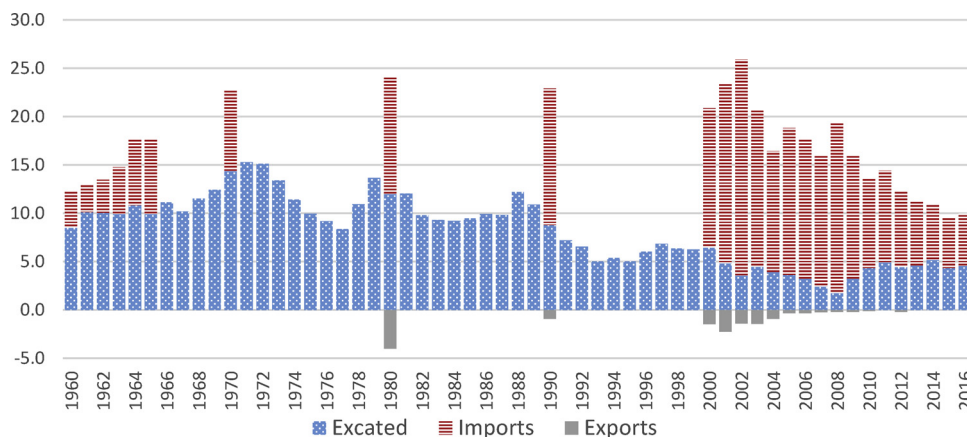


Fig. 1. Gravel excavation, imports and exports, 1960–2016 (in kilotons).

Sources: (Kramer, 1967), Statistics Netherlands (CBS), Rijkswaterstaat - Waterdienst and Environmental Planning Agency, 2018.

### 3. Results

Dutch spatial and excavation policies feature four distinct phases, representing different periods in the constellation of socio-technical practices and the institutional embedding of gravel excavation in these policies. This constellation can be stable or dynamic. During dynamic periods, practices and policies are (re)negotiated by the relevant actors. The outcomes of these negotiations explain the changing practices and policies in gravel excavation. The following paragraphs present an analysis of these dynamics, the actors involved and the outcomes.

#### 3.1. Excavation and land use debates in the age of technocracy (1950–1970)

In the first half of the twentieth century, Dutch governmental authorities had formed autarkic views about resources and material needs. These views, a result of Dutch neutrality and isolation during the First World War, increased the government's involvement in economic and market developments. The governmental support of national coal mining and the establishment of steel works and cement industries are evidence of this. These viewpoints lingered on, and the Netherlands' vulnerable position was reaffirmed during material shortages in the immediate aftermath of the Second World War (Veraart, 2018a).

At the same time, the gravel industries moved their activities to the floodplains and sites near rivers. New hydrological insights and river management had increased the restrictions on gravel excavation from rivers. These measures, and the enhanced navigability of the big rivers, opened up industrial excavation activities along the river Meuse. Its floodplains thus became the Netherlands' major area for supplying gravel. In 1938, the provincial authorities issued the first 'ordinance against the infringement of natural beauty by excavating or digging in the ground' (Van Heiningen, 1991, 259–322). These early regulations demonstrated the tension regarding land use decisions.

Gravel, sand, limestone and other surface-level natural resources were excavated in open pits. It is not clear how the early ordinances affected gravel excavation. Similar regulations for limestone excavation resulted in masking industrial activities by protecting the most visible parts of hill sites. The enormous post-war demand for building materials ended these limitations and saw the start of the first national debates on gravel excavation. The increased demand for concrete became an issue of national interest. (Veraart, 2018b)

In 1950, the minister of Reconstruction and Public Housing Joris in 't Veld, fearing shortages and rising costs of building materials, proposed to transfer the coordination of sand excavation by the Dutch Water Management Agency (Rijkswaterstaat) to the National Plan agency. This executive agency of the Ministry of Reconstruction and Public Housing had been recently established to coordinate spatial

planning on a national scale. In practice, the proposal meant transferring control from the Ministry of Water Management to in 't Veld's own ministry. A ministerial controversy was avoided by establishing an interdepartmental commission to study new legislation on excavations. For the time being, the Ministry of Water Management remained in control (MoDP, 1951a, b).

Outside parliament, the debate on excavation was heating up. In February 1953, only days after the North Sea flood disaster devastated Dutch coastal areas, socialist newspaper 'De Waarheid' (*The Truth*) reported on a local excavation plan:

'While in the South-West of our country thousands are fighting for every centimetre of soil that can be saved from the sea, and in the Zuiderzee reclamation expenses amount to 17 to 18,000 guilders (ca. EUR 8000) per hectare of farmland, at Culemborg 78 ha of river meadows are sold for excavation' (De Waarheid newspaper, 1953).

Although shaken by the contradiction of the moment, the newspaper's real worry was the tenant farmers.

Local authorities also tried to get to grips with these land loss issues. In the mid-1950s, the Limburg authorities modified their excavation ordinance to require full refilling of the gravel pits, thus avoiding loss of agricultural land. The gravel companies opposed this, in their view impossible demand. They argued by pointing at the lack of sufficient material to refill the pits and the extra cost involved. The threat to take the matter to court moved the debate from the province to parliament once again.

Parliament debated the newspaper's ostentation and the conflict in economic terms, as a choice between agricultural land use or land as a resource for building materials. In 1958, parliament asked the Minister of Agriculture to formulate a standpoint regarding the loss of agricultural land caused by gravel excavations along the Meuse. The minister noted that gravel mining was undertaken haphazardly, and that due to combined sand mining, much more land was dug up than anticipated. Given the scarcity of arable land, he ordered an investigation into the economic rationality of gravel mining at a national level. At the same time, he expressed a preference for refilling the gravel pits, with the gravel vendors bearing the costs. According to the minister, this would mean a 10–30 percent reduction in gravel miners' profits and a 1–3 percent price hike for concrete (MoDP, 1958a, b). Commenting on these developments, Member of Parliament Willem Drosen argued:

'I assume that from a national economic point of view, gravel mining is a necessity, but that doesn't give the nation the right to totally mutilate the Limburg countryside for the future. The modern excavating and dredging machines snatch about 50 ha of superior acreage from the banks of the broad river Meuse each year, creating enormous irregular holes up to and soon around the village centres. In order to prevent the destruction of an old and beautiful landscape, the costs of refilling should not be weighed on an analytical balance, but the

Netherlands should say: Beloved Limburg, we need your gravel for our constructions, but we want to repair your damage, even if that means that concrete will become a few percent more expensive' (Droesen, 1957).

Droesen's words reflect the geological and spatial tensions surrounding the excavation activities in the Meuse river floodplains.

Fearing a possible stagnation of the gravel supply, the Ministry of Reconstruction and Public Housing initiated mediation between the province and the gravel dredgers. These negotiations led to a levy on the gravel used to fill the pits. Tax amounting to 0.20 euros per ton of gravel and 0.11 euros per ton of sand was enacted in August 1958 and the income was collected in the so-called gravel fund. The agreement also compelled the gravel dredgers to hand over the empty pits to the province. The provincial authorities would take responsibility for refilling the pits and restoring the landscape to its original agricultural use (Kramer, 1969; MoPL, 2005).

The provincial authorities settled on presumed non-reactive mine rock (i.e. shale and limestone mixed with coal dust) as suitable fill material. The first trials were undertaken to examine the environmental impacts. The trials led to positive advice from the Limburg authorities, who contracted the nearby Dutch State Mines in 1959. From the 1960s onwards, hundreds of tons of mine rock were used to fill the gravel pits. In 1968, more than 4.5 million tons of mine rock were processed, enough to restore 475 ha of land. In that year, the contract was upgraded to an annual bulk of 3.5 million tons. This mass of stones enabled another 200 ha of gravel pits to be refilled (Nieuws van de Staatsmijnen, 1968, 8).

In the post-war years, scientific and technological expertise was steering policies and politics. Dutch historians of technology labelled this period 'the age of technocracy' (Van der Vleuten et al., 2017). Societal development was modelled and planned according to the latest scientific and technological insights. Efficiency, costs and economic benefits dominated the debates. This was also noticeable in the debates about resources and land use. The gravel excavations were framed in terms of resource security and the need for domestic supply. Agricultural land use was mainly viewed in economic and food security terms. Despite some fierce debates on land use and excavations during this age of technocracy, they were settled in pragmatic ways. The enormous material demand shifted gravel excavation from a local to a national issue. National government negotiated with local representatives and other (local) experts to guarantee national resource security. Compensation measures were developed and executed by local authorities. The compromises strived for the best economic application of local natural resources, optimizing both geologically and geographically the mainly agricultural features. Refilling the gravel pits fulfilled the contemporaries needs. Much later however, water quality measurements in the 1980s revealed contamination, which ultimately restricted soil trade in contaminated areas to avoid further proliferations (RIZA, 1986; Opstelten, 2012).

### 3.2. Shifting views in land use policies (1970–1987)

Increasing welfare in the 1960s, however, created new demands on land use. These new spatial demands destabilized the existing institutional and governance structures. In 1961, after more than a decade of negotiations by various political interests in inter-ministerial and provincial commissions, no fewer than six ministers submitted a proposal to parliament for a Law on Subsoil Excavations (*Ontgrondingswet*, MoDP, 1961). Parliament insisted on strong ties with the Ministry of Public Housing. They also advocated harmonization with the newly developed 1961 law on spatial planning. By 1966, the second national policy on spatial planning sketched the rough contours of land use, specifically focusing on space for recreation and nature.

The excavation law was published on October 27, 1965. It merely harmonized the various provincial regulations. From this moment on, sand and gravel industries, when applying for an excavation

concession, were obliged to submit plans for re-use, accompanied by financial underpinnings. The implementation of the permits became a provincial task and had to be aligned with regional spatial plans. Incorporating the excavation proposals in provincial regulations took another few years. Amid discussions and provincial planning, the Law on Subsoil Excavations came into force on September 1, 1971 (MoDP, 1974; Ike, 2000, 31–41).

The nature of the discussions gradually changed. Acquisition of resource materials, water management, and agrarian interests had motivated the excavation law, but the creation of recreational areas gradually became a growing consideration (MoDS, 1965). This was visible in the Limburg authorities' 1969 regional plan for gravel mining locations. Up to this time, excavators had been the initiators of excavations. The provincial authorities devised a new strategy for centralizing excavation locations in an attempt to gain control over gravel excavation.

The debate on the new provincial plans brought other actors to the fore. At the behest of the municipalities along the Meuse, the Catholic University of Nijmegen's social geography department had conducted an economic cost-benefit analysis of the province's proposals. Thanks to the—for that time modern—calculations, they were able to propose an economically viable alternative, transforming the gravel pits along the Meuse into an 'international' center for aquatic sports such as sailing, boating, angling and freshwater bathing. These would create new economic activities, certainly desirable given the imminent closure of the coal mines. The university's advice concluded that filling in the gravel pits and restoring the agrarian function had become less relevant, given agricultural developments in Europe. The analysis revealed the economic advantages of continued gravel mining along the Meuse and transforming the region into an aquatic sport zone with 'international allure' (Kramer, 1967).

The provincial council was receptive to these arguments and consulted the Dutch tourist organization ANWB and the Royal Dutch Yachting Association (KNWV). In 1971, these organizations published a voluminous joint report exploring the potential for sailing, boating and other aquatic leisure activities in the gravel pits. They agreed there were interesting opportunities for this region that had only limited facilities for waterborne recreation in the past. The proximity of Germany was seen as an additional advantage. The gravel pits as new nature zones with unique leisure opportunities would improve the economy of the region (ANWB en KNWV, 1971). In 1974, the province and the municipalities established the Meuse Lakes (Maasplassen) Foundation, to develop and exploit recreational activities. In the 1980s, these operations were privatized and subsequently controlled by project developer Aqua Terra (Philipsen, 1989).

In 1970, the gravel excavating companies and the province signed contracts for new extensive gravel excavation activities around the villages of Heel and Panheel. These contracts centralized excavation activities in one location and gave the provincial authorities more control. They included a twenty-year moratorium on gravel mining outside the newly planned zone (MoPL, 1969). Thus the 1970s became the heydays for gravel dredging in Limburg. Existing permits were excavated next to the new Panheel site, activities that were not without consequences. Gravel excavations rapidly transformed the landscape around the town of Roermond and at many places along the Meuse.

In 1974, the Federation of Shallow Subsoil Resource Extraction Industries (FODI) nevertheless sounded the alarm, warning against what it called a conservative excavation policy by the provincial authorities. Maintaining this policy would mean future material supplies for the building industry and public works sector could not be guaranteed (Sigmond et al., 1984). In response, the Ministry of Transport and Public Works launched an investigation into the demand for raw materials. In 1976 a National Commission for the Coordination of Excavation Policy (LCCO), consisting of Ministry and provincial estate representatives, was charged with investigating the national supply and demand for surface level resources. LCCO developed 'target plans' for

the various provinces in the form of 10-year plans, the first appearing in 1978. These plans set quota to compel resource-rich provinces to assign production sites, thus securing the national demand for mineral resources. The establishment of LCCO was seen as the first step towards a national excavation policy.

The presentation of the first target report also evoked the environmental movement to join in the discussion. The Foundation for Nature and Environment (Natuur en Milieu) presented its ideas for excavation policies. These included alternatives such as the use of demolition waste, dredging mud, and slag from the steel industries. The foundation also highlighted alternative mining sites at sea. In its view, increasing imports was another potential solution. It argued that because of spatial implications, excavation policy should be part and parcel of spatial planning policy, as the latter was more suited to dealing with environmental demands (Grondelle, 1978).

In the 1970s, opinions on gravel excavation were changing. New civil society actors added leisure, environmental and ecological issues to the mix, influencing spatial and excavation policies. Local authorities reviewed spatial aspects in light of the new economic opportunities. The focus had both an economic and social dimensions in the creation of new job opportunities by means of tourism. These were connected to broader international developments in European agriculture. Also the leisure plans exploiting the unique geographical location close to the German border had an international focus. Fully implementing these co-developed plans would increase control over the gravel excavations. The excavated gravel pits would ultimately be transformed into recreational and natural areas, aimed at boosting tourism. Resource planning remained merely nationally oriented. The industry's concerns were solved by the first thorough investigations into national supply and demand. National target policies that could balance domestic demand and provincial supply became the solution to the growing tension between provincial authorities and excavators.

### 3.3. A national excavation policy (1987–2002)

The ten-year target policies remained the primary national policy instrument to plan excavations throughout the 1980s. Negotiations between the government and the Limburg authorities led to a second large gravel excavation site in Limburg, between the villages Stevensweert and Ohé en Laak. Excavations in the second centralized location called 'Steval' began in 1987.

The ministries continued working on the development of a national excavation and quarrying policy. A new government document titled Grounded Excavation (*Geground Ontgronden*) explored the long-term state of the national raw materials supply. The 1987 draft version discussed not only the provincial plans for sand and gravel excavation, but also new alternatives for marl quarrying. The latter ignited massive protests by local communities and authorities against the idea of moving and expanding the marl quarrying activities. With elections looming, the governing liberal politicians re-evaluated the need for excavation as a national resource security issue. They now reframed the building material issue from a European and international standpoint. According to their neo-liberal ideals, the problem should be viewed from a European free-market perspective. The excavation of raw materials was no longer considered in the national interest, and the eventual termination of marl excavation became an option (Rode, 2010; Veraart, 2018c).

The 'Grounded Excavation' publication also marked the starting point for government negotiations with the various provinces regarding 'targets' for the supply of mineral resources. In line with the proposed termination of marl excavations, the Limburg authorities also re-negotiated gravel excavations. Another 80 million tons of gravel would be extracted in Limburg, enough to supply the likely need for the 1990s and possibly longer. The shifted visions of national policies and politics allowed the provincial authorities to negotiate the total termination of all gravel excavations. The policymakers assumed that after the turn of

the century, demand could be satisfied with alternative materials, mining at sea and imports. Re-use of building materials was also an option, according to the new policies (De Jong, 1989; Ike, 2000, 43–44).

Spatial planning policies, such as the Fourth Spatial Planning Memorandum (Extra) (1988), the Third Water Management Memorandum (1989) and the Nature Policy Planning (1990), further altered the course of excavations. Gravel excavation was no longer a means to fulfil national demand, but rather a result of realizing other goals (Aarts, 1998, 26). Flooding and high river levels in 1993 and 1995 added new issues. In Limburg, much of the focus shifted from tourism development to flood protection measures in the Meuse area. Widening of the river's winter bed combined gravel excavation with nature development schemes. The changed policies led to a decline in Dutch gravel excavation and a rise in imports (see Fig. 1).

In this period, national government debates about resource policies opened up to international expansion. The development of a European free market became part of the deliberations. This gave local authorities room to renegotiate supply targets and the future termination of excavations. Local authorities further adjusted the conditions for gravel excavations towards flood protection. Gravel excavation, however, never disappeared. The merged excavation and land use policies in the early 2000s created new scope for gravel excavation.

### 3.4. Merging excavation and land use policies (2002 onwards)

In 2002 a commission chaired by Dick Tommel, the former state secretary for Public Housing, Spatial Planning and Environmental Policy (VROM), formulated policy recommendations for the Structure Scheme for Shallow Subsoil Resources. The commission, entirely in line with the political climate of the time, recommended more leeway for market forces and less central steering by the state.

The freshly elected Balkenende cabinet enthusiastically embraced the recommendations. The planning and coordination of shallow subsoil resources would no longer be a task for the government. Aspects of excavation policy, just like other spatial planning issues, were subsumed in the 2004 Spatial Policy Document. This document expressed a new direction for politics. Government regulation was to be transformed into overall planning: 'Decentralize where possible, centralize where necessary' became the new mantra, whereby the state shifted the responsibility for spatial planning to the provinces.

For excavation policy, this meant gradually abandoning coordination via targets and liberating market forces. The new plan underscored the importance of local extraction to prevent the displacement of environmental problems, needless transport, and excessive energy consumption. Policy aimed at so-called 'multifunctional' extraction, uniting extractive imperatives with local needs.

It is expected of the excavating industry that it will orient itself to the development of qualitatively good and societally responsible projects in close cooperation with the affected parties. (...) It means that in the course of extraction, use must be made of the opportunities offered by excavations for the realization of other desirable social functions like nature development, recreation, waterfront residences, water management, and the dredging of shipping channels. In this way projects can be realized that improve spatial quality and provide the Netherlands with raw materials' (VROM, 2006, 162).

This policy shift put an end to the promised reduction and termination of gravel extraction. Limburgers followed the news with eagle eyes. In 2009, Limburg newspapers headlined: 'Dredgers return' and 'Open door for gravel mining' (Hammes and Hensels, 2009a, 2009b, 2009c).

Nature conservation organizations, however, greeted the news more positively. They were already struggling with the first Rutte cabinet's new right-populist policies. These policies had cut budgets for nature development projects by 70 percent, relaxed environmental regulations, and postponed or ended elements of the European Natura 2000

network (Buijs et al., 2014). Multi-functional gravel excavation now offered unexpected opportunities for nature development. Former opponents, the dredging companies and nature conservationists, became new partners in the creation of wet nature development projects (Heijne, 2011).

As a rule, the additional demands placed on gravel and sand extraction led to price increases. The opened-up European market and strong focus on economics resulted in a severe decline in domestic production, and increasing imports of much cheaper sand and gravel, particularly from Germany (Van der Meulen et al., 2003; Koopmans and Pietersen, 2002). Transportation costs hardly played a role as the distances by road or boat were virtually equal. The Dutch floodplains of the Meuse as locations for gravel supply were replaced by the German floodplains of the river Rhine.

In Germany, notably the Nordrhein-Westfalen authorities were not pleased. In their view, the Netherlands was simply transferring its problems to a neighbouring country. But the Tommel Commission re-defined the problem. It saw the German irritation with Dutch policy shifts as an indirect encouragement for Dutch policy:

‘The commission views resistance in Germany as a positive development for Dutch policy. Whereas in the Netherlands there seems to be a consensus that we want to work towards the development of qualitatively good and socially responsible excavation projects, in Germany the debate about goals is still in full swing. The commission expects that in the long run, due to social pressure, more demands will be made on projects, which will ultimately lead to a decline in the acquisition of cheap sand and gravel from Germany. (...) A potential price increase will in fact provide new opportunities for multi-functional projects and the utilization of secondary raw materials’ (Tommel et al., 2009, 18).

The phasing-out of a directive role for the national government was concluded in 2012 with a parliamentary debate. Regarding the diplomatic pressure from Germany, Minister Melanie Schulz van Haegen (Infrastructure and Environment) wrote:

‘Via diplomatic channels, the cabinet has received signals from the government of Nordrhein-Westfalen that it is not happy with this. The Netherlands does not unnecessarily want to burden its neighbours with the spatial demands of raw materials acquisition (...) I share the expectations of the Tommel Commission that new projects have the potential to replace a substantial share of these imports. But this is dependent on market and price developments and on the demands imposed in Germany on the execution of sand mining projects and the processing after extraction’ (Schultz van Haegen, 2012, 7).

In the eyes of the Dutch government, an increase in German exports to the Netherlands was the result of a free market. The lack of sustainability measures in Germany made its shallow subsoil-resources attractive for the Dutch market. The Dutch government, whose remarks could be read as a suggestion to German politicians, was not averse to more stringent demands and higher prices. It reasoned that these provided more possibilities for recycling and more valuable multi-functional excavation.

Since 2002, the government abandoned resources politics explicitly relating to national excavation activities. An international open market should facilitate the national resource demands. Local authorities became the main actors in setting the preconditions for excavating activities. They were driven by local demand and local support, which increased societal support and reduced excavation activities. The Dutch gravel demands were now fulfilled with cheaper foreign resources.

#### 4. Conclusions

This article studies the transitions in land use practices, spatial and excavation policies since the 1950s in the Netherlands, and the ensuing reactions in words and deeds of multiple stakeholders to the changing debates and regulations. In this we added not only a long term dimension but also interesting interregional and transnational elements to the dynamics of spatial and resource politics.

Resource and spatial policies followed different trajectories, which national and local actors reviewed in different transnational contexts. In the years leading up to the 1970s, the issue gradually developed in a context of national autarky thought. Excavations were discussed in terms of national resource security. Also in land use, national interests dominated the debate. Agricultural land uses were reviewed in terms of economics and food security.

In terms of sustainability developments up to the 1970s centralized around economic tradeoffs. The local revision of excavation activities in light of economic regional restructuring and increasing control in spatial development changed the dynamics. Now social dimensions of job creations and room for leisure became part of the local equation. Nature development was very much seen as prerequisite in the development of tourism. It was only in the 1990s and 2000 that nature development became an issue in its own right. These developments however were often combined with flood control measures.

The excavation activities resulted from national autarkical thought. Most of the gravel was also used domestically. Local authorities introduced broader views into the debate. Spatial needs were discussed in context of international developments in the European agricultural market and tourism development. However at the same time the resource supply and demand issues became further institutionalized in a national setting. These developments could however go hand in hand, heralding the heydays of gravel excavation that quickly transformed the Meuse valley.

The national excavation policy in the 1990s evoked a transnational turn. Domestic excavations were no longer seen in connection with national demand. Resource demands were reviewed in a broader international context. Gravel excavation became a means of fulfilling other goals in flood protection and nature development. The 2004 Spatial Policy Document merged the excavation policies with spatial planning. It also moved spatial governance to local authorities. Local decisions on the environment, economy and spatial planning now determined the national excavation of building materials.

This historical analysis describes the development of resource and spatial policies as a dynamic process. It was co-constructed by multiple actors working at local and national levels. These actors mobilized their views on future expectations for spatial needs and resource demands in local, national and international contexts. Conflicting views about spatial application drove the co-construction of policies and excavation activities. The analysis shows how the new interests in leisure, landscape, nature, and the European free market got entangled in land use and excavation policies; how stakeholders found solutions in the face of growing environmental concerns, a developing neo-liberal economic discourse, and ongoing national demand for building materials.

Despite the existence of large quantities of sand, gravel, and marl, the domestic mining of mineral raw materials declined. Gravel excavations became less a means to an end, but rather a way to develop new spatial opportunities backed by local needs. The offshoring of gravel excavation was considered unproblematic and a result of European free market mechanisms, while the response to foreign complaints could even be seen as policy advice. Not only gravel excavation, but also its policies were shoved across the border.

This is by no means a process that has come to an end. The current offshoring of gravel might seem unproblematic within the European context, however the dynamics described in this article are now visible in the offshoring of mining of rare earth elements and specialized metals elsewhere in Europe. These developments are now being critically reviewed (European Union, 2008, 2014). As a result, new local, national and international expectations at various governance levels will inform new visions for spatial needs and resources.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.landusepol.2018.12.023>.

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