HAN
MEYER

The changing state of the Dutch delta

ABSTRACT

The spatial structure of the Randstad Holland is strongly related to the policy concerning hydraulic engineering in the Netherlands. Both, Randstad Holland and the large hydraulic works, can be considered as part of the 'modern project' of the Netherlands, undertaken in the nineteenth and twentieth centuries. This modern project aimed to upgrade the Netherlands as a modern welfare state, based upon an industrial economy and agricultural autonomy, and fitting in a coherent policy of the nation-state.

These days, the societal as well as the economic and the climate context of the Netherlands are changing. The new Delta-program, started in 2008, should be considered in this changing context. The potential meaning of this program is that it should not only be regarded as a provision of a new, proper flood defence infrastructure. It can play a substantial role in the transition to a new spatial, economic and political structure of the Netherlands.

1 INTRODUCTION

This paper describes the development of the spatial structure of the Randstad Holland as an outcome of a combination of different processes: the dynamics of the delta-landscape, the changing economic and technical conditions and the changing societal conditions. The combination of these three processes has resulted in different development-stages of the Randstad region, each time with a specific spatial structure as an outcome. Each change from one stage to another can be regarded as a *critical transition* (Scheffer, 2009), which can be defined as a crucial process to find a new balance among the three processes, resulting in new spatial patterns.

From the end of the twentieth century, the Dutch delta region, including the Randstad area, finds itself in a phase of critical transition again. The dynamics of the delta-landscape itself, influenced by climate change with effects like sea level rise and increasing peak-discharges of the rivers, play an important role in this transition process. However climate change is not the only reason for a serious reconsideration of the spatial system of the Dutch delta region. Also new developments in de economic position and structure of the Randstad area and in the societal organization of the Netherlands force to a revision of the formation of the urban landscape in the delta.

2 NATION-BUILDING AND INDUSTRIALIZATION

Until the end of the 18th century, the Netherlands was a federal republic of autonomous provinces and cities. During the eighteenth century, this loose collection of autonomous regions and cities was increasingly regarded as an obstacle for new economic development and political power (De Vries, van der Woude, 2005). When the Dutch Republic came under French command during the Napoleonic period, the process of national unification accelerated. An important measure was the foundation of a national Water Management Agency in 1798, later named *Rijkswaterstaat* (Bosch, van der Ham, 1998). After 1814, when the Netherlands became an autonomous Kingdom, the process of national unification was continued. Confronted with the problems of Holland and with the decay of the accessibility of the seaports especially, prime minister Thorbecke proposed to remove the seaport activities from Rotterdam and Amsterdam to the cities Vlissingen and Harlingen (van der Woud, 2006). The concern of the Dutch government was not only the weak economic position of the Netherlands in this period, but also the strong contrast between the relative rich and powerful cities in Holland and Utrecht, and the poor and weak position of the other provinces. The struggle between central government (federal in seventeenth and eighteenth centuries) and the cities in Holland concerning political and economic power dates back from the early seventeenth century (Brand ,2011).

The development of new seaports in the outskirts of the national territory would create more balance in economic development and political power in the national territory.

Especially Vlissingen was regarded as a potential main port, situated next to a deep channel, which guaranteed permanent accessibility. During the 1860s a special railroad was constructed to link Vlissingen with the German hinterland, and a series of new harbours were planned around the city. However, this second turning inside out was not realized. The established powers of port and trade companies of Amsterdam and Rotterdam did not agree with a total removal to the periphery of the country. Moreover, this proposed removal of the ports didn't solve the increasing flooding problems of the upstream river areas. It was the engineer Caland who showed that digging a new waterway from the sea to Rotterdam could solve two problems: it would create a new access to the Rotterdam port and it would function as a new discharge channel, which would relieve the upstream areas from the superfluous river-water. By studying historic maps, Caland discovered the tendency of the Rhine to move its mouth southbound. First the Old Rhine was silted up after the thirteenth century, now the same happened with the mouth of the Meuse. By digging the New Waterway, he tried to fixate the outlet of the Rhine (Ten Horn van Nispen et al., 1994; Van

de Ven, 2008). In 1872 the Nieuwe Waterweg was opened. In order to avoid a negative effect on Amsterdam, also this city was provided with a new entrance from the sea by digging the North Sea Canal, which was opened in 1876 (van der Geest et al. 2008). The Nieuwe Waterweg and North Sea Canal were part of a large series of canal- and canalization projects in the river area, providing a better navigability as well as an improved discharge of the rivers (Ten Horn van Nispen et al. 1994).

Together with the reclamation of the Haarlemmermeer and other dug peat lakes, the new canal projects resulted in a huge transformation of the area of central Holland. The port activities of Amsterdam and especially of Rotterdam exploded; while the other Dutch ports North and South of central Holland fell in further decay. After the reclamation of peat lakes in the interior of the region, agriculture increased again. And perhaps more important, the reclaimed Haarlemmermeer offered the vacant lots to start the first Dutch airport *Schiphol,* southwest of Amsterdam (Bosma, Makhloufi, 2012)

Central Holland had become the central economic region of the Netherlands more than ever, while adjacent regions became more than ever peripheral areas and fell in poverty (Brusse, van den Broeke, 2006).

3 NATIONAL UNIFICATION, AGAINST THE METROPOLIS

The attempt of Thorbecke to remove the centre of economic activities to the outward periphery is illustrative for the increasing concern in Dutch government in that period about the increasing contrast between the urbanized and rich centre of Holland and the rest of the Dutch territory, which was still an 'empty land' (van der Woud 1987) and very poor. However the new hydraulic projects of the 1870s enforced this contrast by stimulating economic and urban growth in the area of central Holland.

The concern with this contrast was continued and increased in the twentieth century. In the same time also the need for a radical modernization of the flood defence infrastructures was formulated. While the amount of people and the invested capital in the western part of the Netherlands was increased substantially, the flood defence structures around central Holland still dated from the 15th and 16th centuries. Especially the flood defences around the Zuiderzee and in the Southwest delta were considered as insufficient. Since 1879, a special organization headed by engineer Lely, plead for the construction of a closing dam in the Zuiderzee (van der Ven, 2004; van der Geest et al. 2008).

The vulnerability of both aspects (the concentration of population in Holland, and the weak flood defences) was demonstrated during the First World War. The Netherlands took a neutral position during this war, but was deprived of the import of food from other parts of Europe. Especially the cities in Holland were starving seriously during the last years of the war. Moreover, the Zuiderzee area was confronted with two heavy storms in 1916 and 1917, which inundated large parts of the Northern part of Holland including some parts of Amsterdam, and led to fifty deadly victims.

Both events, the famine and the floods, were reasons to accept finally the proposals of Lely cum suis to close the Zuiderzee with a dam and to reclaim large parts of this inner sea for agricultural purpose (van der Geest et al. 2008). The construction of the *Afsluitdijk* (Closing dike) resulted in a shortening of the coastline and a transformation of Zuider Zee into a fresh water lake. An important reason for the giant project of damming and reclamation the Zuiderzee was the extension of agricultural area. By closing the Zuider Zee and reclaiming a large part of this sea during the 20th century, the agricultural land of the Netherlands would extend with 1650 km² (4% of the land-surface of the country). Zuider Zee was renamed in *IJsselmeer* (IJssel Lake). The new IJsselmeer-polders became the prestigious and exemplary model of modern agriculture, showing a new type of efficiently parcelled agricultural land. But it also provided an opportunity for an experiment with comprehensive spatial planning. A system of new towns and villages was carefully planned and designed. The ambition to define a harmonious spatial relationship between townscape and (polder-) landscape played an important role in these plans (van der Wal, 1998).

Combined with a policy regarding selection of the population, the new polders became a model of spatial planning as the central discipline which integrates agricultural and economic policy, town planning and urban design, hydraulic engineering, and demographic and social strategies (Bosma, 1993, Andela, 2000). The polders became a testing-model for a comprehensive spatial planning approach, which would be applied for the nation as a whole some years later.

In 1924, an International Town Planning Congress took place in Amsterdam, where the need for a National Spatial Plan was formulated (Bosma, 1993), in order to reach a more equal distribution of economic activity and welfare on the national territory. During the following years, this idea was elaborated in several studies, for instance by de Casseres (1926) and Kloos (1939). The possibility

to prepare a National Plan was created during the Second World War, when the Rijksdienst voor het Nationale Plan (National Agency for Spatial Planning) was founded. After the war, plans were prepared to repeat the concept of the Zuiderzee to the Southwest delta: closing the estuaries with dams. Engineer van Veen, who was in charge of this giant project, emphasized that the meaning of such a work would be far more than just delivering safety for the urbanized centre of Holland. In 1950 he published his book 'Drain, Dredge, Reclaim: the Art of a Nation', which emphasized the meaning of a large-scale flood defence structure around the Dutch territory as an expression of national unification and national identity (van Veen, 1950). Van Veen had to wait until the flood disaster of 1953, causing two thousand deadly victims, before the national government was fully convinced of the necessity of the Delta-works.

During the 1950s, plans for closing the estuaries of the Southwest delta were prepared in combination with plans to extend the urbanization of the Randstad with a series of New Towns and industrial areas in the Southwest delta and the IJsselmeer reclamations. Governmental institutions warned that an on-going urbanization of the cities of the Randstad themselves would lead to a sticking together of the Randstad-cities and finally to one giant and uncontrollable metropolis, with all the problems of congestion, social contrasts, poverty, diseases and criminality. The first two National Memoranda on Spatial Planning (1959 and 1966) were dominated by the strive for *preventing* the development of such a metropolis. (van der Cammen, de Klerk 2003). And, as was said in several documents, the new IJsselmeerproject and Deltaworks delivered the excellent condition for a new spatial policy, by using the reclaimed and protected land for new urban and economic development (Provincie Zuid-Holland, 1957; Constandse, 1976).

So after the proposal of Thorbecke for a reorganization of the main ports in the 19th century, a second attempt took place to dismantle the concentration of urbanization and economy in the Randstad. This time it was more embedded in a more institutionalized and legal structure of planning and execution, while the projects of IJsselmeer polders and Delta works delivered the physical conditions for this policy (FIGURE 2). The result was rather successful, with a series of New Towns in the IJsselmeerpolders. Almere is the largest one and still plays an important role to relieve the pressure on the Amsterdam housing market (Berg et al., 2007).

Also for the Southwest delta a new 'Delta-City' was planned, together with an enormous extension of the Rotterdam port and industrial areas (Provincie Zuid-Holland, 1957). However this city was never realized. The labour-productivity in the post-war port and industrial areas appeared to be much higher than originally calculated, while the demographic growth appeared to be much less than expected. Nevertheless, also the Southwest delta was transformed from a poor and peripheral series of isolated islands to an industrialized, wealthy and integrated part of the nation. The New Waterway increased in importance; instead of an entrance it became the central axis of a 100-km^2 industrial port area, with the largest port of Europe and the 2nd largest petrochemical refinery centre of the world. Also in other parts of the Southwest delta several new industrial areas were developed, while agriculture took profit from the new fresh water basins in the area because of the damming of the estuaries. Moreover, the Southwest delta became an important destination for tourism and recreation. The basic condition for these developments was the combined construction of the new system of dams with new road-network roads, which made the islands accessible for car traffic.

Even for The Hague an outward extension was proposed. During the 1980s the engineer and politician Ronald Waterman proposed an extensive reclamation along the coastline of The Hague, offering the possibility for new urban development at the seaside (Hooimeijer et al., 2005).

The strategy of distribution of economic and urban development outside the Randstad was also applied in other regions of the Netherlands. A national road-network was the basic condition for this policy; the dams in the Zuiderzee and the Southwest delta delivered the possibility to involve the isolated Southwestern and Northern regions in this policy too. Next to it, development in peripheral areas was stimulated by the removal of national agencies from the Randstad area to the Northern provinces, stimulating new industries in all the peripheral provinces and the founding of new universities in Eindhoven, Twente and Maastricht. In just a few decades after the war the sharp contrast between the exclusive centrality of the Randstad with the peripheral and poor regions was changed fundamentally. It is true that the Randstad is still the undisputed central area of the Netherlands. However the differences between Randstad and other provinces in terms of economic growth, income and urban amenities are much less than one century ago (CBS, 2012).

All together the Dutch Delta transformed substantially in a century, contributing to a new urban configuration of the Randstad – as expressed in figure 1. The combination

of hydraulic engineering, urban planning, industrial and agricultural policy, formed a 'modern project' par excellence, celebrating the modern welfare state, based upon an industrial economy. The New Zuiderzee-works and Delta-works themselves were part of this industrial society. With these man-made products of rationalized planning and production the Dutch nation showed to be able to overcome the fight against nature: a triumph of modernity! Also the approach of spatial planning and urban design fits in this idea of the modern project.

4 THE RANDSTAD AND THE SECOND DELTA PROGRAM

Until the 1960s national policies put a strong emphasis on national independency, based upon a rationalized and holistic program in which agriculture- and industry-policy, efficient road-systems, modern town-planning and hydraulic engineering were interwoven. From the 1970s, all these elements became subject of doubt, resistance and reconsidering. The last three decades of the 20th century show a transition to another reality, a farewell to industrial and agricultural independency, rationalized town-planning, national hydraulic engineering, and a reform of the welfare state.

Several new trends undermined the existing consensus and paradigms of urban planning and hydraulic engineering as a nucleus of societal and spatial coherence. These trends are based upon (1) economic motives, (2) ecological motives and cultural motives, (3) political and financial motives, and (4) spatial development motives. Last but not least the climate-change has become a fifth motive since the late 1990s, forcing drastic changes in the policies concerning spatial planning and hydraulic engineering. For a more extensive explanation of these motives I like to refer to other chapters in this book and other papers (for instance Meyer, 2009).

Here it is important to pay attention to the changes in the Dutch culture of spatial planning and urban design as well as in hydraulic engineering and water management.

Regarding spatial planning, the policy of the Dutch government has changed substantially during the last decades. First, the mainstreams in politics tend to a radical reform of the welfare state, like in many other western countries. The embracement of neo-liberal concepts resulted into an abolishment of the central position of the national government in spatial policy. Prepared during the nineties, and formalized during the first years of the 21st century with the 'Nota Ruimte' ('Memorandum on Space' Ministerie VROM, 2005), the national government has moved many responsibilities to the municipal and provincial authorities, and stimulates the role of the market in spatial development.

Second, an essential exponent of the disappearance of a consensus regarding spatial planning is the eroding of the Randstad concept. Since the 1990s the individual cities are more involved in a new competition with each other (in which Amsterdam is more and more a winner) than tending to become a coherent region (Ritsema van Eck et al., 2006). Instead, the Randstad area tends to be divided in a 'North-wing' and a 'South-wing'. The provisional and remarkable result is that Amsterdam and surrounding cities have proclaimed themselves 'Metropolitan Region Amsterdam' in 2011 (see website Metropolitan Region Amsterdam); Rotterdam and The Hague answered one year later with the proclamation of the 'Metropolitan Region Rotterdam – The Hague' (see website Metropolitan Region Rotterdam – The Hague). Remarkable especially is the change of meaning and appraisal of the word 'metropolitan'. While it was an indication of what the Randstad should *not* become during the post-war decades, it is used now as an advertisement and indication of what the cities *do* want to be.

Regarding the ambition of the big cities to play a central role in the development of regional entities, large-scale water systems and water-landscapes are discovered as important potential carriers of regional spatial structures. Already from the 1980s an impressive transformation of former docklands has taken place. 'Eastern Harbours' and the construction of a large-scale new reclamation for the new urban district 'IJburg' in Amsterdam, 'Kop van Zuid' in Rotterdam, show a new focus on water-related areas for urban development, with the new Erasmus-bridge in Rotterdam as a symbol of the rediscovery of the river as the heart of the city. The Hague realized a new boulevard in Scheveningen, emphasizing that it wants to be a 'World-City at the Sea' (Gemeente Den Haag, 2005). Also for the next future these cities are developing strategies based upon the spatial development of regional water-structures: in Amsterdam along the IJ and IJ-lake, in Rotterdam along the river Nieuwe Maas and The Hague at the seafront (Meyer, 1999; 2007).

Parallel to this process, the ideas and conceptions on flood-defence and water management were changing substantially. The central role of the state as organizer of the welfare state is weakening, decreasing and changing. Large flood defence works won't have the same meaning anymore as elements of 'nation-building' as they had in the 1950s and 1960s.

This process started already in the early 1970s, when environmental action groups

protested against the completion of the Delta works and IJsselmeer polders. As a result, the two last masterpieces of these projects, the East Scheldt Dam and the Markerwaard, were cancelled. The protection of the areas at the East Scheldt was solved with an alternative solution, a storm surge barrier, which maintained the tidal currents in this basin, saving the existing ecosystems with the mussel-, oyster- and lobster-cultures (Schipper, 2008). The Markerwaard was not reclaimed, partly because of the disappearance of the immediate necessity of new agricultural land (van der Wal, 1998). Only the surrounding dam 'Houtribdijk' was realized, cutting the IJsselmeer in two separated water bodies. Since, especially the Markermeer is suffering serious ecological problems because of the absence of currents and the shallowness of the lake.

The attention to nature-values and ecological qualities became an important issue in water management policies. In 1986 a design-competition concerning a new lay-out for the river-area near the city of Arnhem resulted in the first price winning design *'Plan Ooievaar'* ('Plan Stork'), which aimed a repair of retention-areas and wetlands, resulting into a come-back of the ecological balance of the river area before the canalizing (de Bruin, Hamhuis et al., 1987). It was the start for a series of 'de-polder'-projects in the river- and delta-area in the next decades, aiming to create new wetlands, which provide more space for river-water as well as a repair of environmental qualities.

In this changing context, some extreme high water situations in the Dutch rivers in 1993 and 1995, as well as the disaster with hurricane Katrina in New Orleans in 2005, addressed the need to update the quality of the flood defence structures in the Netherlands. Two ambitious programs were started by the government: 'Ruimte voor de Rivier' (Room for the River) in 2005 and the Delta program in 2008. For both programs it was and is the question how to integrate the new environmental issues in an overall flood defence program. Especially the Delta program will have con sequences for the spatial structure of the Randstad area; Room for the River can be considered as a preliminary laboratory to test new concepts.

The program 'Ruimte voor de Rivier' focuses on the river-landscapes in the centre and the east of the Netherlands, where a series of medium-size towns are regarded as bottlenecks in periods of extreme river-discharges. The policy itself and the projects along the rivers are dominated by the ambition combine new flood defence measures with increasing the conditions for environmental quality and spatial quality. In several cases, the program forced city authorities to reconsider waterfront-plans fundamentally, in order to create more space for the flow and temporary storage of river water (Kwaliteitsteam Ruimte voor de Rivier 2012). This holds well also with regard to the starting report of the 'second Delta-program', which is subtitled 'Working together with water'. (Delta committee, 2008). The aim of this Delta program is to prepare the Netherlands for a future (2100) when extreme river discharges through the Rhine might be extended from 12.000 m^3 per second to 18,000 m^3/sec, and when sea level might be risen 130 cm above the current mean level. New measures will be necessary to be able to deal with these changing conditions concerning the river area, the coastline, the Southwest delta and the IJsselmeer area. Important questions are if the coastline will be able to withstand heavy storm surges in the future (when sea level is expected to be much higher), and if the river area will be able to endure unprecedented discharge volumes. However the most important question will be if the delta will be able to deal with the worst-case scenario of a coincidence of an extreme storm surge and an extreme river discharge. In this case, especially the South-west delta and the IJsselmeer should be able to provide extra storage capacity for river water, which only can be voided at the sea when the storm surge is over.

This need for a fundamental reconsideration of the IJsselmeer, Southwest delta and coastline, can have substantial consequences for the spatial future of the Randstad area. It can also be regarded as a new challenge.

For the IJsselmeer, extending the storage capacity should be considered in combination with questions like the future of separation between IJsselmeer and Markermeer, the need to improve the quality of the ecosystem especially in the Markermeer, and the relation between Amsterdam and the New Towns Almere and Lelystad.

For the Southwest delta, the future of the mouth of the Rhine has returned on the agenda. As we have seen before, the river mouth tends to move southward. Caland has fixated the river mouth by digging the New Waterway in the 19th century. This intervention has brought a lot of economic activity and prosperity to the Rotterdam region. It created also an increased vulnerability for flooding in this region and a larger influence of intruding salt seawater in the region. The vulnerability for flooding has become a problem especially since large areas of former docklands, unprotected by dikes, have been urbanized and inhabited. These days, approximately 60,000 people are living in these areas in the Rotterdam region. It is true that the Maeslant

storm surge barrier in the mouth of the New Waterway can be closed during heavy storm surges, protecting the outer-dike areas in the Rotterdam region. However, because of sea level rise this barrier will have to close more frequently in the future, which will not be appreciated by the port authorities. Reducing the frequency of closing the barrier will mean that the outer-dike housing areas should be provided with adaptive measures. The alternative is to build a lock-system in the New Waterway, forcing the port to concentrate all port terminals at the west side of the locks.

Important for the investigation of new possibilities and spatial concepts is the stimulating role of the NGO 'Eo Wijers Foundation', which organizes competitions for regional design. Their initiative to organize competitions concerning the future of the IJmeer (IJ-lake) between Amsterdam and Almere and the future of the Rotterdam-Dordrecht region, resulted into a series of new proposals for future developments of these regions. The first prize winning proposal for the Amsterdam-Almere region shows the possibility of a new urban configuration around the IJmeer, with a series of new wetlands which should function as a purification-machine for the polluted Markermeer (FIGURE 2). The first prize winning proposal for the Rotterdam-Dordrecht region shows the new possibilities when the New Waterway will be closed and the whole region will be protected by a new dike-ring, combined with a road, while the southern delta-area will return to a more 'wild nature' environment (FIGURE 3).

These proposals try to regard the restructuring of the hydraulic system as the most strategic intervention: it creates the possibility to improve water-management, storage capacity, flood-defence and biodiversity, as well as the possibility of strengthening water-structures as the main elements of an improved spatial structure of the metropolitan region. (Ettema ed., 2006; 2009).

However, in general a new consensus concerning the spatial development of the Randstad area in combination with a new national flood defence concept is lacking. Until now, the Delta program and the development of the metropolitan regions are still two separated roads. The challenges for combining these two roads in a new spatial strategy are still waiting to be picked up.

5 CONCLUSIONS AND DISCUSSION

The great works of Dutch hydraulic engineering, like the damming of the Zuiderzee and the construction of the Deltaworks were not self-evident; they were the result of long periods of public and political debates. Finally they contributed to an important transition of spatial patterns in the Netherlands. Instead of only a densification of the Randstad area, also an outward extension took place. Moreover the new hydraulic infrastructures contributed to the rise of the nation-state and to a new balance between central state power and local communities.

In the beginning of the 21st century the Dutch delta finds itself in a stage of fundamental transition. Also now the choices are not self-evident. A renewal of the water management and flood defence system can function as the engine of a reconfiguration of urban structures, this time by strengthening the metropolitan regions of Amsterdam and Rotterdam – The Hague. This might also contribute to and fit in a development to a new balance between central state responsibilities and local or regional responsibilities – as well concerning spatial planning as concerning hydraulic engineering. However that requires that politicians, planners, hydraulic engineers and urban designers are able to see these possibilities at the regional scale, to create strong collaborations and to discuss the different possible perspectives with the public.

So far it is not yet. The big difference with the previous stages is that there is not an immediate reason, driven by a sense of urgency, which creates a public and political awareness concerning the need of a radical intervention. In the previous periods such a sense of urgency was created by disastrous events like floods or the serious economic decay of cities. This time, the Delta program is motivated not by a disaster but by the ambition to prevent a possible future disaster. The possibility of this disaster has been calculated by scientific research, which is something else than a real time flood event. The point is that we should be able to see that new delta-interventions will not only create conditions for more safety in the future, but that it can especially contribute to a new future for the spatial and governmental structure of the Randstad.

REFERENCES

ANDELA, G. 2000. *Kneedbaar landschap, kneedbaar volk. De heroïsche jaren van de ruilverkavelingen in Nederland*, Bussum, Thoth.

BERG, J., FRANKE, S. & REIJNDORP, A. (eds.) 2007. *Adolescent Almere,* Rotterdam, NAi Publishers.

BOSCH, A. & VAN DER HAM, W. 1998. *Twee eeuwen Rijswaterstaat 1798–1998*, Zaltbommel, Europese bibliotheek.

BOSMA, K. 1993. *Ruimte voor de nieuwe tijd. Vormgeving van de Nederlandse regio 1900–1945*, Rotterdam, NAi publishers.

BOSMA, K. & MAHKLOUFI, A.E. 2012. *De ruimtelijke metamorfose van Schiphol. Van polderdorp naar nevelstad. In:* TAVERNE, E., DE KLERK, L., RAMAKERS B. & DEMBSKI, S. (eds.) *Nederland Stedenland. Continuïteit en vernieuwing*, Rotterdam, NAi Publishers, pp. 124-138.

BRAND, N. 2012. *De wortels van de Randstad. Overheidsinvloed en stedelijke hiërarchie in het westen van Nederland tussen de 13de en de 20ste eeuw*, Delft, TU Delft.

DE BRUIN D. & HAMHUIS, D. et al. 1987. *Ooievaar. De toekomst van het rivierengebied.* Arnhem, Stichting Gelderse Milieufederatie.

BRUSSE, P. & VAN DEN BROEKE, W. 2006. *Provincie in de periferie. De economische geschiedenis van Zeeland 1800–2000*, Utrecht, Matrijs.

VAN DER CAMMEN, H. & DE KLERK, L. 2003. *Ruimtelijke Ordening. Van Grachtengordel tot Vinexwijk*, Houten, Spectrum.

DE CASSERES, J.M. 1926. *Stedebouw*, Amsterdam.

CBS (Centraal Bureau voor de Statistiek). 2012. *Welvaart in Nederland. Inkomen, vermogen en bestedingen van huishoudens en personen,* Den Haag, CBS.

CONSTANDSE, A.K. 1976. *Planning en vormgeving – Ervaringen in de IJsselmeerpolders,* Lelystad, Rijksdienst voor de IJsselmeerpolders.

Delta Committee. 2008. *Working together with water*, Den Haag, Ministry of Infrastructures.

ETTEMA, M. (ed.) 2006. *Eo Wijers Prijsvraagronde 2006 – Tegen de stroom in, met de stroom mee*, Den Haag, Eo Wijers Stichting.

ETTEMA, M. (ed.) 2006. *Eo Wijers Prijsvraagronde 2008 – Buiten in de Randstad,* Den Haag, Eo Wijers Stichting.

VAN DER GEEST, L., BERKHOF M. & MEIJER, M. 2008. *Het hoofd boven water. Tweehonderd jaar investeren in waterwerken*, Utrecht, Nyfer.

Gemeente Den Haag. 2005. *Wèreldstad aan Zee. Structuurvisie Den Haag 2020,* Den Haag.

HOOIMEIJER, F., MEYER H. & NIENHUIS A. 2005. *Atlas of Dutch Water Cities,* Amsterdam, SUN.

KLOOS, W.B. 1939. *Het Nationaal Plan, proces eener beschrijving der planologische ontwikkelingsmogelijkheden van Nederland,* Alphen a/d Rijn.

Kwaliteitsteam Ruimte voor de Rivier. 2012. *Jaarverslag 2009-2010-2011.*

MEYER, H. 1999. *City and Port. Transformation of Port Cities London, Barcelona, New York, Rotterdam,* Utrecht, International Books.

MEYER, H. 2007. *The Search for new structure and the regional context of Dutch cities. In:* La Greca P., Albrechts L., Broek J. van den, ISOCARP Review nr.03 – Urban Trialogues. Co-productive ways to relate visioning and strategic urban projects, pp 78-93

MEYER, H. 2009. Reinventing the Dutch Delta: Complexity and Conflicts. *Built Environment,* 35(4), pp 432-451.

Ministerie VROM. 2005. *Nota Ruimte,* Den Haag.

Provincie Zuid-Holland. 1957. *Randstad en Delta. Een studie over de ontwikkeling van het Zuid-Hollandse Zeehavengebied*, Den Haag.

RITSEMA VAN ECK, J., VAN OORT, F., RASPE, O., DAALHUIZEN, F. & VAN BRUSSEL, J. 2006. *Vele steden maken geen Randstad,* Rotterdam/The Hague, NAi Uitgevers/Ruimtelijk Planbureau.

SCHEFFER, M. 2009. *Critical Transitions in Nature and Society,* New Jersey, Princeton University Press.

DE SCHIPPER, P. 2008. *De slag om de Oosterschelde. Een reconstructie van de strijd om de open Oosterschelde,* Amsterdam/Antwerp, Atlas.

TEN HORN-VAN NISPEN, M.L., LINTSEN, H.W. & VEENENDAAL, A.J. (eds.) 1994. *Wonderen der Techniek. Nederlandse ingenieurs en hun kunstwerken. 200 jaar civiele techniek,* Zutphen, Walburg Pers.

VAN VEEN, Joh. 1950. *Dredge, Drain, Reclaim. The Art of a Nation,* The Hague, Martinus Nijhoff.

VAN DE VEN, G.P. (ed.) 2004. *Man-made lowlands. History of water management and land reclamation in the Netherlands,* Utrecht, Matrijs.

VAN DE VEN, G.P. 2008. *De nieuwe Waterweg en het Noordzeekanaal; een waagstuk, onderzoek in opdracht van de Deltacommissie*

DE VRIES, J. & VAN DER WOUDE, A.M. 2005, *Nederland 1500-1815. De eerste ronde van moderne economische groei,* Amsterdam, Balans.

VAN DER WAL, C. 1998. *In Praise of Common Sense – Planning the ordinary. A physical planning history of the new towns in the IJsselmeerpolders,* Rotterdam, 010 Publishers.

VAN DER WOUD, A. 1987. *Het Lege Land. De Ruimtelijke Orde van Nederland 1798–1848,* Amsterdam, Meulenhof.

VAN DER WOUD, A. 2006. *Een Nieuwe Wereld. Het ontstaan van het moderne Nederland,* Amsterdam, Bert Bakker.

website Metropolitan Region Amsterdam, http://www.metropoolregio-amsterdam.nl/

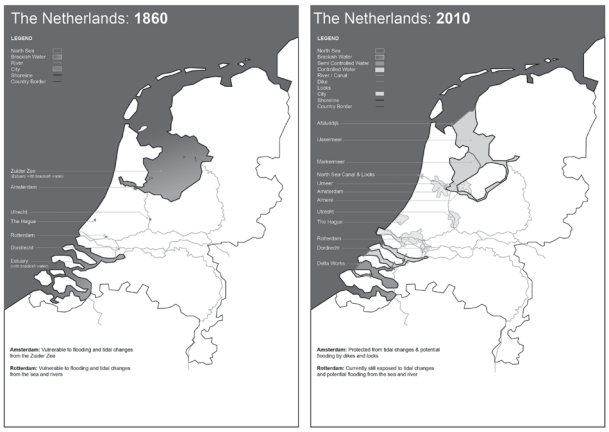
website Metropolitan Region Rotterdam – The Hague, http://mrdh.nl/

FIGURES

1
The transformation of the Dutch Delta from 1860 to 2010: new access-canals to the ports of Amsterdam and Rotterdam and shortening the coastline by damming the Zuiderzee (including new reclamations in the IJsselmeer) and the Southwest delta.

2
'Markeroog', 1st prize Eo Wijers competition 'IJmeer' 2006. Design by West 8 Landscape Architects

3
'Blauw Bloed', 1st prize Eo Wijers competition 'Deltapoort' 2008. Design by Kuiper Compagnons.



1 2

Next page > 3

3