

Decline and rise

of

Rijkswaterstaat

*Two centuries of history*

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The most important intervention in the river system in the 18th century was the realisation of the Pannekoekens Kanal. It effected a bifurcation of the Rijn branches and it improved the division of the discharge of water. This aerial photo gives an overview of the beginning of the canal at the bifurcation near Millingen. From this point onwards the Boven-Rijn (at the bottom) runs its course as the Waal. The problems with the rivers were the main reason to come to a national water management organisation: the present Rijkswaterstaat.





*The ecoduct over the A50 motorway (Arnhem-Zwolle) near The Woeste Hoeve. Rijkswaterstaat comes up with mainly technical solutions to the problem that motorways often cut across the natural biotope of animals. They vary from large-scale crossing-places for game such as ecoducts to smaller provisions such as grids and tunnels for small game.*



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*The Batavian Revolution was the start of a complete turnabout in politics and administration. At the end of January 1796 the first election for a modern representative administrative body, the National Assembly, took place. The people who were elected assembled on 1 March for a festive opening. In doing so they laid the foundation for a united state which, eventually, was to lead to a national department of water management.*

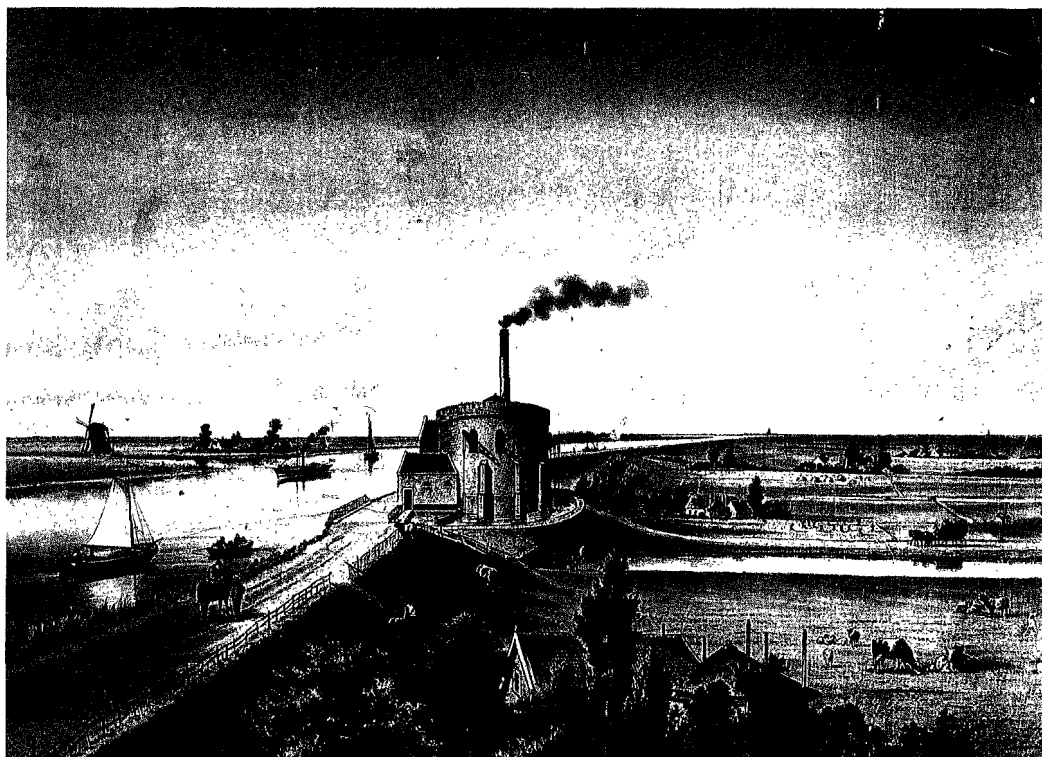
## The birth of Rijkswaterstaat

On May 24 1798 the Directorate-General for Public Works and Water Management (Rijkswaterstaat) was established following a coup d'état.

Centralisation of water management was hard to realise in the Netherlands, not after fatal storm surges, not even after innumerable river floods, nor after the French invasion in 1795, which put an end to the Old Republic.

In January 1798 the radical Unitarians, who tried to break down the power of the provinces and the large towns, did, however, succeed in centralising water management. The success lasted two years, when another coup d'état reversed relations, but it was in these two years that 'a department for the management of all matters pertaining to water management' was established. The department consisted of a president, a head clerk, an assistant '...who could draw with compass and pen.,' a cartographer, a technical assistant. Fieldwork was carried out by seventeen employees.

In spite of the turbulent times, the department survived the Batavian and French period (1795-1813), and thus commenced the history of one of the most fascinating and distinctive organisations of the Netherlands.



*The reclamation of the Haarlemmermeer was the first to be carried out entirely with steam power from three steam-driven pumping stations, each with a capacity of 360 h.p., which was unparalleled at the time. The only remaining pumping station, the Cruquius is shown here on a school print dating from around 1880.*

## Fascinating and distinctive

This is an accurate description of how two centuries of Rijkswaterstaat have left their mark on the Netherlands. The river landscape has been completely transformed, the coastline has been shortened by more than 2800 kilometres (from 3400 kms to 650 kms), well over 200,000 hectares of land have been reclaimed in this period (which does not compensate by far for the loss of about 570,000 hectares since the year 1200).

The Netherlands has gained about 3,000 kms of railways, about 4000 kms of navigable waterways, well over 18,000 kms of cycling tracks and more than 100,000 kms of metalled roads during those two centuries.

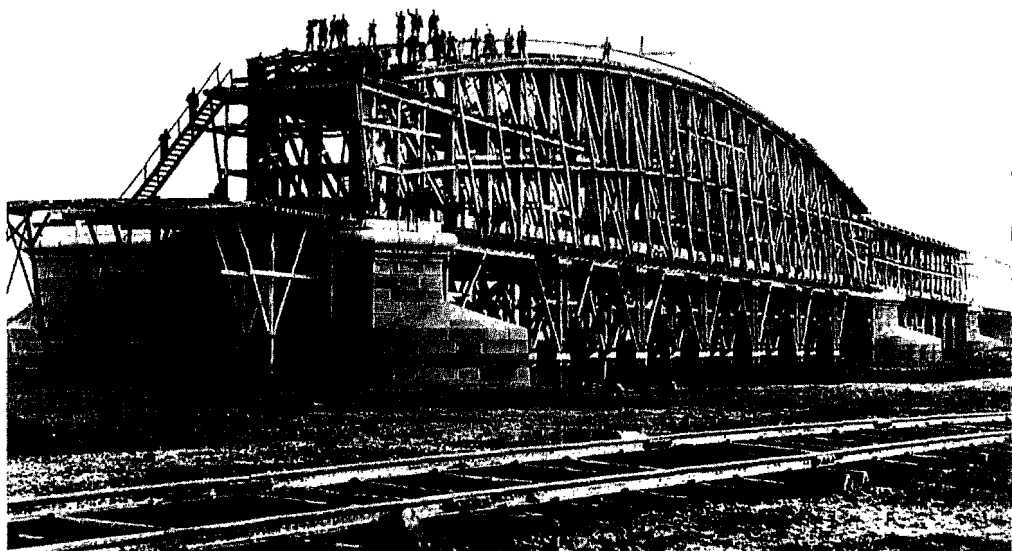
Rijkswaterstaat has been closely involved in realising this infrastructure or has, in many cases, carried out the works itself. At present it is in charge of the main infrastructure: 2100 kms of motorways and 3600 kms of shipping routes.

Apart from that, many engineering works dominate the Dutch landscape: flood-control dams, locks, storm surge barriers, bridges, viaducts, clover-leaves, tunnels and fly-overs. They have taken the place of those elements that used to be characteristic of the horizon: spires, windmills, pollard willows and poplars.

Rijkswaterstaat started its work in a country that was -by our standards- empty and unsafe.

Some two million inhabitants lived here, scattered over hamlets, villages and small towns. Their world was restricted, in most cases the horizon was the border of their community. Life was uncertain and insecure, due to the untamed rivers and an unpredictable sea.

In the course of two centuries Rijkswaterstaat has managed to control the forces of nature in the delta considerably and to improve safety to a large extent. Thanks to this infrastructure, the Netherlands became an entity as to mobility and traffic and therefore one nation emotionally and politically. We feel Dutch, we have a common language, national political parties and national symbols, such as 'Orange'. It is a long time since the population lived at or even below the poverty line. They live in a lavish consumer society and they have a system of social fundamental rights. The economy has boomed and the national income has increased sharply. The large-scale, infra-structural and water management system that has been developed during the last two centuries is the basis of the modern Netherlands. Rijkswaterstaat is the main designer of this system.



*The construction of the railway track Utrecht - Den Bosch, part of the state railway net, was a difficult project for Rijkswaterstaat as 3 large rivers had to be bridged. In 1869 the track was largely completed, as well as the main span of the bridge over the Maas at Crèvecoeur, shown here.*

## Decline and rise

Such a characterisation of Rijkswaterstaat may lead to hagiography, a glorious historiography of the organisation. Nothing is further from the truth, as Rijkswaterstaat was not the only one active in the field of water management and infrastructure and, in view of Dutch relations, had to reckon with lots of other parties. That is why two centuries of Rijkswaterstaat is also the story of district water boards, politicians, municipalities, provinces, building contractors, journalists, environmentalists, cyclists, motorists and many other interest groups. Rijkswaterstaat plays a variety of roles in the social play. Supporting roles in regional and local matters such as that of consultant, supplier of knowledge, informer, representative of national interests. Leading roles in national tasks such as that of supervisor, policy-maker, designer and constructor. A biased illustrious historiography of Rijkswaterstaat is avoided as the organization fluctuated with the various movements of the tides in the past. In the two hundred years of its existence successful and less prosperous times alternated. The department went through some serious crises, during which public support was lacking and its future was at stake. Only recently, in the seventies and eighties, the organisation was subjected to heavy criticism for the devastating effect its policy had on environment, landscape and town and country planning.

Three long fluctuations of rise and decline in the history of Rijkswaterstaat can be distinguished:

- The aristocratic-traditional period (1798-1850)
- The democratic-mechanical period (1850-1930)
- The technocratic-scientific period (1930-1995)

This is the story of these fluctuations.

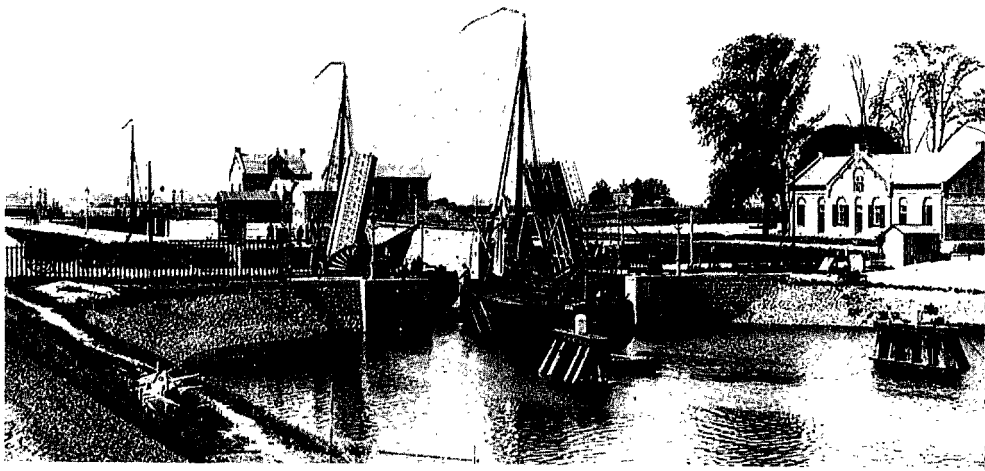


## The aristocratic-traditional period

It was the rivers that forced the Netherlands into 'unity, unanimity and indivisibility' in the field of water management, quoting the key words of Mr. Christiaan Brunings, Rijkswaterstaat's first general director. The 18th century saw thirteen serious river floods, although there were years with incidental dike bursts. In that century every generation in the river area had to deal with a flood disaster at one time or another. The river beds were in poor condition and the number of rivermouths to the sea inadequate. The discharge of high water and of ice in particular (after a severe winter) stagnated in this problematic bottleneck and the bifurcation of Rhine water over the various branches was complicated. The latter problem was solved by works on the upper rivers which were only realised after extremely reluctant cooperation between the provinces and after pressure had been exerted by Prussia. Water management was the responsibility of district water boards, local authorities and provinces, a system that worked adequately for discharge problems, but not for rivers and coast defense (to a lesser degree). The 'velvet' revolution of the Batavian and French period (1795-1813) introduced political relations, guaranteeing a certain measure of 'unity, unanimity and indivisibility' into water management, with the birth of Rijkswaterstaat as a remarkable result. After a turbulent start the department came in smooth waters under King William I from 1813 onwards. The district water boards remained autonomous for the greater part. The provinces, however, were granted the power to intervene in their regulations.

The provinces were charged with the supervision of the sea and river dikes. The national government retained final responsibility over the entire water management and the control over a number of sea and river works of national importance. In the day-to-day running Rijkswaterstaat did not turn out to be a real national organisation, as it operated for both national government and the provinces, thus reflecting the vague and sometimes problematic relationship between these two authorities. King William I, however, provided the department with an opportunity to develop into a full-grown organisation. As king of the new Kingdom of the Netherlands, which also included the Southern Netherlands after 1815, William I ruled as an enlightened despot with indefatigable energy. He received the honorary title of 'king-merchant' as promoter of trade and industry and the title of 'king of the canals' as initiator of some 500 kms of new canals and the improvement of many other shipping routes. He might also have received the title of 'king of the roads', for under his rule a connecting system of roads was built, or he might have received the title of 'king of new land' as initiator of several reclamations, among which the Haarlemmermeer, the largest reclamation of the 19th century. His rule was authoritarian and aristocratic, he was peremptory and hardly ever delegated duties. The decision making process of large projects took 5 to 6 years on an average (nowadays it takes 15 to 17 years): he took four years to decide on the Cologne Canal (1821, the later Amsterdam-Rijnkanaal); his decision on the Noord-Hollands Kanaal (1819) took three years

*< Thanks to the digging of the Bergse Maas, the Maas now had its own new mouth to the sea. Here we see the new river meandering its way to the sea.*



*The (then new) Merwedekanaal in 1880, meant as an improved Amsterdam-Rijn connection.*

and the Zuid-Willemsvaart (1822) seven years. Rijkswaterstaat profited: huge investments, great projects, much work. The department enjoyed great prestige.

This prestige was not a matter of course, for the Rijkswaterstaat employees were of a lower class than the administrative elite with whom they worked together. In the class society of those days this was a serious handicap. In the early days the Rijkswaterstaat employees were mainly sons of skilled workers (windmill builders, land surveyors, overseers), thus coming from the lower middle classes. They had been trained on the job, which proved to be insufficient for the next generation, who were educated at one of the military academies. The first water management training was given at the 'General Theoretical and Practical School for Artillery, Engineering and Water Management' in 1805. Finally, in 1829, the training ended up at the Royal Academy in Breda.

The training became an admission requirement for the 'corps engineers of the general Waterstaat'.

It selected the engineers, who from then on were recruited mainly from the upper classes. Besides, it stressed the military character of the organisation, which had clearly been influenced by the French. Although the employees were now theoretically trained, the practice still required skilled labour. The theory did not relate to the problems with which the engineers were faced. They had to make do with the know-how which for generations had been passed on by hydraulic engineers and which had been tested in practice.

Impressive results were achieved, if we look at the large projects of the first half of the 19th century. One of the main problems, however, could not be solved, namely the problem of the rivers. Opposite lines of solutions were proposed. The experts could not reach a consensus, and from an administrative point of view the matter was still complicated, so that progress stagnated.

There was another reason for the stagnation.

In 1830 Belgium had separated from the Netherlands and King William I had proclaimed a fruitless but expensive and lengthy mobilization. In the thirties investments in water management and infrastructure dropped dramatically. Although later on some important decisions were to be made, in particular on the construction of the Rhine railway (1838) and the reclamation of the Haarlemmermeer (1839). Nevertheless, the reign of the king, who in 1840 renounced the throne, ended in a minor key. Rijkswaterstaat was reduced to a marginal organisation with minimal means and inferior tasks, a constant victim of reorganisations and spending cuts. Moreover, the management had noticeably weakened, prominent Waterstaat employees had died or retired.

Their successors lacked authority within the corps and outside. The military-trained engineers from the higher classes were too young and had not yet reached the top ranks.



## The democratic-mechanical period

The depression in the Rijkswaterstaat lasted till the emergence of the liberals, who, led by Thorbecke, staged a bloodless revolution in 1848. It marked the end of the influential role of the monarchy.

The introduction of the ministerial responsibility enabled parliament to dismiss a minister and thus influence policies. The administrative relations, particularly those between government, provinces and municipalities were more clearly laid down in legislation, which in the long term resulted in a clear division between the national and provincial water management. The fervour of the liberals was infectious. Waterstaat engineers talked of 'a new-born land' and thought the time was ripe for great plans: the construction of railways, improvement of the rivers, new canals and the Zuiderzee as plan of attack. The hydraulic engineers had to keep patient for a while, but subsequently expenditure for public works and infrastructure increased significantly: from circa NGL 3 million in 1850 to well over NGL 16 million in 1870. It was as yet not clear which role Rijkswaterstaat was to play, because the liberals favoured a passive government and active private enterprise. River improvement was a task for the national government.

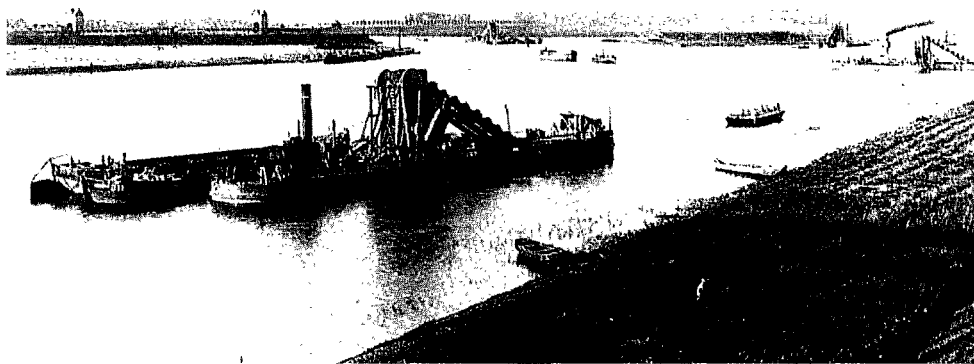
Rijkswaterstaat tackled the matter energetically and proposed to construct new river mouths, to change the riverbeds drastically (to clean up, to regulate, to build breakwaters and groynes, etc.).

And thus a huge project was started employing successive generations of hydraulic engineers and finally Rijkswaterstaat paid off an old debt: an end to river floodings.

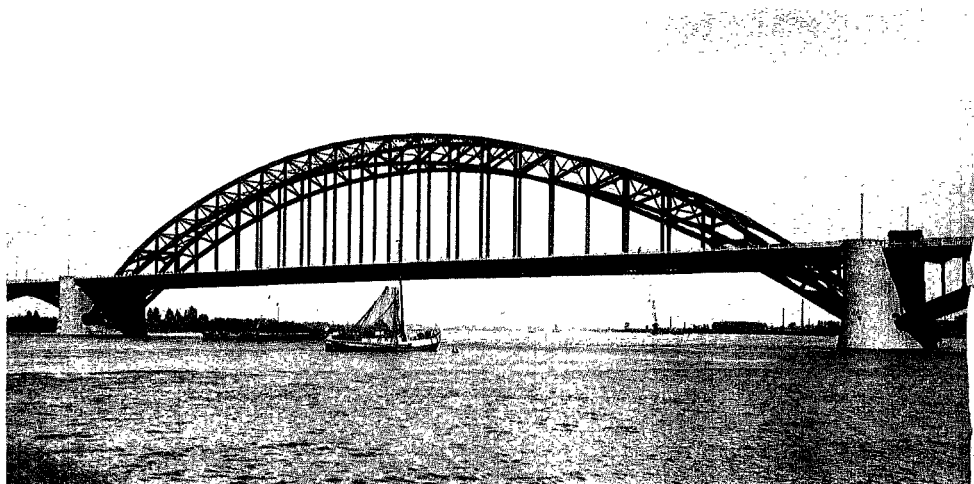
The department also left its mark on the railway policy. Construction became a task for the national government. To this end a special department was created in 1860 which had, initially, a numerical superiority of seconded Rijkswaterstaat engineers in managerial positions. The Noordzeekanaal was dug by private enterprise under the supervision of Rijkswaterstaat. The Nieuwe Waterweg, however, fell under the competence of the national department. In short, Rijkswaterstaat worked successfully on a number of prestigious projects and its own reputation increased correspondingly. The success was also the result of a new basic technology, viz. steam. Steam dredgers were used for rivers, steam pumping stations in problematic discharge situations, steam pile drivers for strong foundations, steam excavators for the construction of canals etc. Without the large-scale employment of mechanical power, the works would not have been completed at all or at great cost.

Around 1900 Rijkswaterstaat remarkably enters a period of relative calmness in a dynamic world. The Netherlands is industrialising at a high speed, socialism is developing into a political power, the antithesis capital and labour controls the social debate and in science there are many breakthroughs. In technology, too, revolutionary developments occur such as the introduction of reinforced concrete, the introduction of electricity and the use of scale models, all very relevant techniques for hydraulic engineering.

< The succession of times, the Zuider or Kleine Sluis (1876), the Midden Sluis (1896) and the Noordersluis (1930) near IJmuiden. They were all constructed to provide Amsterdam with an adequate waterway to the sea.



*The new Berge Maas is linked up with the existing part of the river Maas near Heusden in 1904.*



*The traffic bridge at Nijmegen after its completion in 1936. This bridge is one of the first new large traffic bridges constructed in the 20th century.*

There was an abundance of plans at the beginning of the 20th century: the canalization of the Maas, further improvement of rivers for better navigability, infrastructure for the emerging motor traffic and the closing and reclamation of the Zuiderzee which were still on the agenda. The management of Rijkswaterstaat was still divided among itself and reacted none too adequately and rather luke-warm to the new techniques and the plans, although sufficient means had become available. From the side of the politicians the department was criticized for its slackness, indolence and inertia. The organisation was too bureaucratic and not effective enough. It is typical that the Zuiderzee Works were not allocated to Rijkswaterstaat, but were placed with a separate department because of the lack of confidence in Rijkswaterstaat. It is also typical that part of the Rijkswaterstaat engineers were relieved: the project was much too risky in their view.



*Following the United States and England in particular, asphalt and tar, in addition to bricks and concrete, played an increasing part in road construction. The mixture had to be processed after it had been heated, as we can see here during the construction of the Utrecht - De Bilt road around 1930*



## The technocratic-scientific period

The year 1930 brought the change, remarkably enough at the moment the country found itself at the eve of a serious economic depression.

The appointment of a new director-general, Mr. J.A. Ringers was decisive. Mr. Ringers tackled a number of problems energetically, he gathered a team of able engineers round him and entered upon a path of reorganisations. Essential in the reorganisation was the institution of specialist services with projects and techniques as core activities. These services had the same or sometimes even more authority than the regional divisions, which, until then, had been the backbone of Rijkswaterstaat. So the department was partly turned into a functional organisation and thus regained the public's trust. During the years of the depression it was one of the few governmental organisations which did not suffer from cuts. It was provided with ample means to invest in roads, canals, canalization and reclamation, and became the largest public employer. At the same it applied many of the new techniques and enjoyed the fruits of technological progress to the full. Theoretical approaches had yielded results in some essential hydraulic fields, such as soil mechanics and hydrodynamics. New types of design methods, such as the application of the mathematical model, the scale model and the electric analogy became the fashion. A break-through in the 'scientification' of technics had been reached. Rijkswaterstaat became the controller of the delta. Even the 1953 storm-surge had been forecast by the department and brought to the attention of the government, but in vain.

This may seem a sign of weakness, in practice things were different, however. In the fifties and sixties Rijkswaterstaat predominated in the field of water management. According to their own ideas they built new hydraulic systems, new coast defense systems and new infrastructure works.

Many projects were not even regulated by law, and even if this was done, it was often by hindsight.

It is typical that decision making in large projects had shrunk back to minimal proportions: an average of 7 years as to 13 to 14 years in the period 1850-1940.

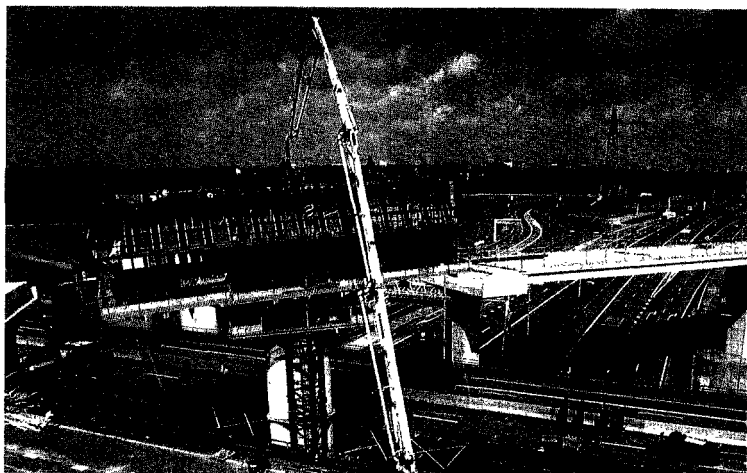
It is saying too much that Rijkswaterstaat had absolute power, the department had to reckon with ministers, government and parliament.

Relations, however, were strained and the initiative was usually with Rijkswaterstaat. The department did not succeed in controlling closely related fields, such as rural planning, and it had to tolerate urban developers, geographers and other specialists, and met with keen competition from other ministries and services, such as the Department of the National Plan.

The image of a 'state within a state' dates back to this period, as well as the heroic image of Dutch hydraulic engineering. It is true, Rijkswaterstaat had ascended the throne, but it must at the same time be said that it had been put on the throne by the Netherlands. The reversal came as abruptly as it had been unexpected. The department was totally unprepared and so it was a long and deep fall.

The heroes of the Delta Works were down-graded to short-sighted engineers, authoritative specialists,

< The flood barrier in the Oosterscheldedam in 1985. The construction of the Oosterscheldedam with the flood barrier, keeping the Oosterschelde 'open' and yet safe, revolutionized people's opinions on nature and the environment.

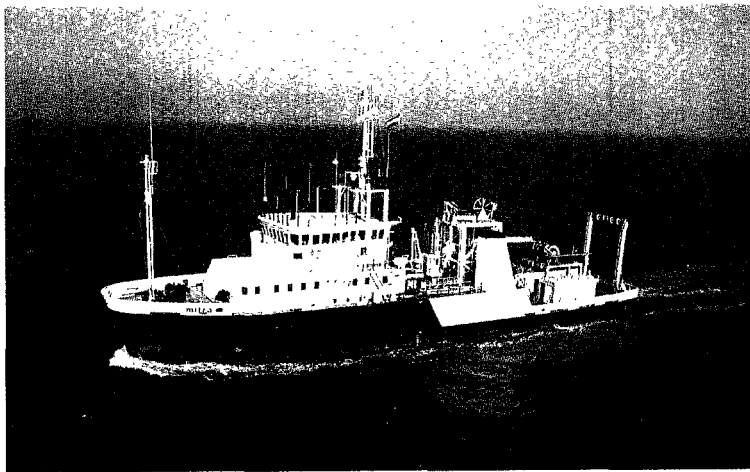


*The construction and enlarging of intersections make increasing demands on technology and organisation. Modern construction and concrete techniques enable the builders to keep the building time relatively short. On this illustration dating from 1997 work is being carried out on the fly-over at the Ridderkerk intersection.*



*Clearing snow and combatting icy patches on motorways are among the traditional tasks of Rijkswaterstaat. The so-called wet salt sprinkling technique was introduced in 1991, because in this way the negative effects on the environment could be lowered drastically.*

asphalt machines, environmental polluters and destroyers of the landscape. A symbol of this decline can be found in the motorway that runs through Amelisweerd (constructed in spite of much opposition), the reclamation of the Markerwaard (which has not been carried out) and the Oosterschelddedam (a totally new design after widespread public protest). The cause was much more deep-rooted, of course. At that time faith in continuing progress was being eroded and modern technology was heavily criticized in the Netherlands. Cultural changes undermined Rijkswaterstaat's credibility as well. Moreover, in the eighties the country went into economic decline and the government started to cut back in expenditure and to hive off tasks. The number of Rijkswaterstaat employees decreased from about 12,000 to 9,000. Large projects came to an end and investments dropped.



*A major Rijkswaterstaat task is safeguarding the water quality and carrying out ecological marine research. To this end the department has a number of specialised vessels at its disposal, such as the Mitra.*



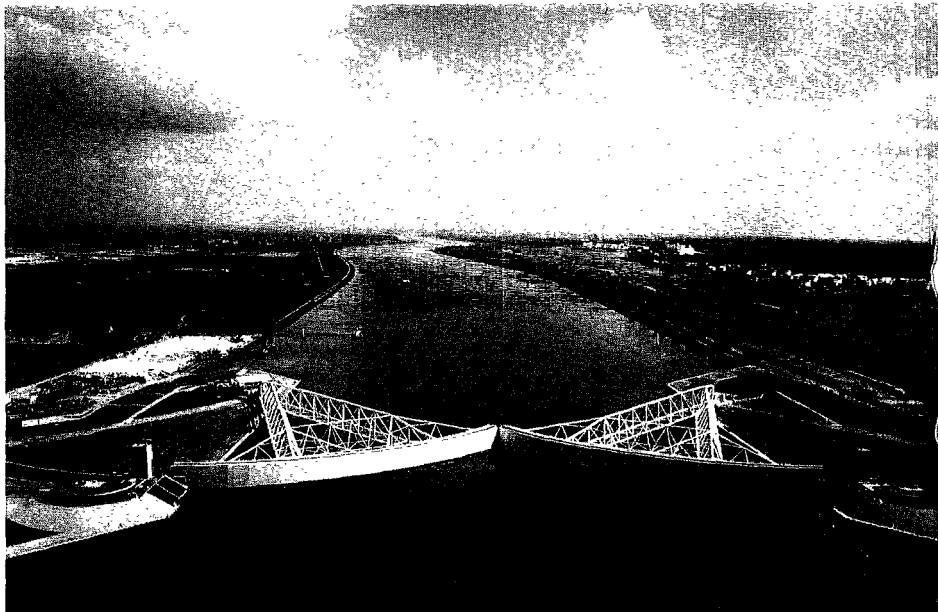
## Interactive and integral

Rijkswaterstaat rose again from the ashes, not only by external pressure but also by its own flexibility. The portents were already visible in the seventies and eighties, at least to those who cared to look. Biologists, town and country planners, behaviour experts and administrators flooded the department, bringing along another language and another culture. Rijkswaterstaat became less formal. Environment and landscape became focal points and the organisation became more accessible now. The turn came in the middle of the nineties and if the indications are reliable, Rijkswaterstaat is on the eve of a new era. For the first time in years the budget was increased in 1994. The number of employees has grown for the first time since 1982. More importantly, there are plans for the future. The Netherlands is on the threshold of fundamental changes. The country will see major changes once more. Investments for infrastructural projects are expected to rise to NGL 100 billion until 2010 and to NGL 200 billion in 2020.

A substantial part of it will be spent by Rijkswaterstaat, however, in a different way than in the fifties and sixties. If the 'underground' tendencies of the seventies and the eighties continue, the words 'interactive' and 'integral' will be the key words of Rijkswaterstaat in the years to come. 'Interactive' stands for creating public support by involving social groups in the process of designing, decision-making and execution. 'Integral' stands for attempting to reconcile conflicting developments and interests, in particular safety, economy and ecology.

Another tough job has to be done. Part of the land in the Netherlands has to be replanned through restructuring agriculture. Urban developments put pressure on urban and rural areas. Increasing industry, international trade and transport of goods require a new adaptation of the physical infrastructure. The problem of automobility seems insolvable due to the ever-increasing use of cars and the ensuing pressure on the environment and the quality of life.

All these problems and the administrative complexity have landed town and country planning in a deadlock. And last but not least there is still incessant fight against the waters. The sea level will rise still further, the ground level in the Netherlands will continue to drop and the rivers will retain their unpredictable behaviour. Rijkswaterstaat is not yet finished with the sea and rivers, not by a long shot.



*In 1997 the Maeslantkering, the flood barrier in the Nieuwe Waterweg, was completed. The project, the final link in the Delta-plan, cost around 800 million guilders. The movable barrier, the result of a competition among contractors, consists of two semicircular steel doors 22m high and 210m long. They are attached to ball-and-socket joints on the bank by means of lattice lever arms. The barrier will probably only have to be closed once every ten years.*

#### **Colofon**

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