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DUTCH WATER CONTROL SYSTEMS, 900 - 1990

A multi-functional common pool resource:
a research proposal.

Jos C.N. Raadschelders
Department of Public Administration
State University of Leiden
Rapenburg 59
2311 GJ, Leiden,
The Netherlands.

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1. INTRODUCTION

During the 8th and 9th centuries the people living in the Low Countries, presently known as The Netherlands, experienced a major change in the physical-geographical environment in which they lived. Up to then they had inhabited a mainly dry land, shaped during the last ice age (Pleistocene; diluvial grounds) and the following warmer period (Holocene; alluvial grounds) starting 10.000 B.C. and continuing to the present day.

At several instances in the last millennia this territory was penetrated by the sea, a phenomenon geologists call transgression, followed by periods of retraction (also known as: regression). During a regression phase the coastal area was protected through the build-up of an array of dunes. Due to global changes in weather, temperature, and sea-currents the Low Countries suffered a new sea-penetration from the eight-hundreds onwards, referred to as the medieval transgression. This changed the environment entirely, especially in the western (coastal) part of the country. The higher diluvial grounds in the east and south were by and large unaffected.

In the southwest a large delta came into existence with briny water, resulting from a mix of seawater with water brought by the rivers Schelde and Rhine. This part of The Netherlands is nowadays known as Zeeland (saaland), and was then composed of several smaller and larger islands. In the west and northwest (known as Holland) numerous larger and smaller lakes were created. Among the larger lakes to be mentioned: the 'Haarlemmermeer', the 'Schermer', the 'Purmer', the 'Wormer', the 'Beenmster', the 'Wijkermeer', the 'Y', and the 'Zuyderzee'. The land-pattern then can in a sense be compared with today's lake-pattern in Finland, lots of water, small land-areas. There is however one important difference. Finnish lakes do not have an open connection with the sea, while the delta and lake-area were constantly harassed by the tidal movement.

Between the late ninth century and 1953 the western part of the Low Countries suffered from many major floods, the last one of which (Zeeland, 1953) resulted in a major effort to protect the land against the sea-movement. The project that was undertaken, world-wide known as the Deltaworks, has recently been completed (1953 - 1988).

Since the late ninth century inhabitants of the area became acutely aware of the fact that they could not protect their property on the basis of an individual, independent effort. Since the ever-present waters posed a constant threat to

their livelihood, they came to perceive the protection of their land as a common interest. The first dykes in the northwest, built in the late 9th century, were the result of a cooperative, mutually beneficial effort. Between the 9th and the 14th century the number of dykes increased rapidly. The dykes protected the land of many farmers, and a farmer was held responsible for the upkeep of the dykes-part that adjoined his property. To ensure that every farmer would fulfill his duties, regular inspections were held by a delegation of inspectors chosen from among the farmers. Local government had barely come into existence, and only active in the field of justice (Raadschelders, forthcoming). The dyke-system was very important for three reasons. They protected the land against possible floods, already mentioned. Next to that, roads were built on top of them, so that they became important thoroughfares that attracted people to settle nearby. Many settlements and villages were thus created. Lastly, the dykes were part of an irrigation-system by which, as soon as sluices and mills were invented, the water-level in each part could be regulated according to the need (depends on the crop; a difference of 2 centimeters above or below median in the groundwaterlevel¹ can be enough to drown or dehydrate the tulip-bulb harvest).

Up to the 12th century the dyke-building 'corporations'

involved mainly farmers. From then on government became involved as well, and that is closely related to in Dutch local government development (Raadschelders, forthcoming). Government gradually took over the monitoring function from the farmers. They also started to levy taxes, tolls to pay when passing a waterway or road.

Between the 12th and the 15th century the originally rather loosely organized water-control system institutionalized. These institutions were called 'waterschappen', a word synonymous with the German 'Wassersehaften'. Lacking a better expression in English we will use the word 'water-board' (¹).

¹ As mentioned above The Netherlands have diluvial, high-lying, and alluvial, low-lying grounds. The high-lying grounds are characterized by sandy soil and peat-moors. The low-lying grounds have mainly clay soil and peat-bogs. The word 'polder' is used in The Netherlands for those water-control systems that are not above, and mostly below sea-level. A large part of the provinces of north- and south-Holland lie several meters below sea-level. A typical polderproblem is a high groundwaterlevel, and many mills - used to pump water from lower to higher surrounding canals - can be found in the west of the country. As one expects., a typical problem for the south and east is a low groundwaterlevel. Much less mills are found in those areas. Since 'polder' has a distinct meaning in The Netherlands, I propose henceforth to speak of 'water-boards'.

A waterboard administers a water control system with sluices, dykes and irrigation works. In the beginning they were rather small, covering an area that could be considered as a physical-geographical unity, limited by a natural boundary (a stream, a lake) that generally was the legal boundary as well. The oldest waterboards were administered by landowning farmers living in the area of the board ('ingelanden' - inlands). Later on local government came to be represented in the water-administration.

As time went by, water control systems became more and more refined, but this could not prevent the land from being continuously flooded. The St. Elizabeths flood of 1429 is still mentioned in Dutch history books. It is this constantly endangered life that resulted in some sort of an amalgamation of waterboards. The existing water-boards remained independent, but became part of a High Waterboard that covered a much larger area and received responsibility for tasks considered to be of a regional character. In 1544 Charles V (Holy Roman Emperor, King of Spain and The Netherlands) installed a High Waterboard in the northwest area (the 'Hoogheemraadschap van de Uitwaterende Sluizen en Kennemerland'), a large part of the present province of north-Holland. The smaller waterboards were from then on known as 'inlying'. The fight against floods was no longer solely a local matter, but had become a regional policy issue.

The involvement of local government, and especially of the chartered towns, increased from the second half of the 16th century onwards. The period 1550 - 1650 is the first phase of massive land-reclamation in The Netherlands. Before 1600 mostly smaller lakes were turned into fertile land; after 1600 many of the great lakes in the northwest were impoldered. As one of the prime investors, cities and gentry partly gained control of the water-administration. They had a say in the election of the president dyke-reeve ('dijkgraaf'), as well as in the election of his fellow dyke-reeves ('heemraden'). The president dyke-reeve and his colleagues formed a college, comparable to mayor and alderman, being the executive in the waterboard. They organized meetings of the farmer-landowners. In case of large waterboards (in terms of area-size) the inlands would choose representatives from among them to the Council of Inlands.

This structure is by and large still to be found, although many has changed in the water control system since the early 17th century.

These changes are the following, and they are intertwined:

- decline in the number of waterboards;
- land-reclamation;
- relations with central government;
- differentiation and increase of tasks;
- interdependency, complexity and overlap;
- increased representivity in water-management.

In the last 400 years the number of waterboards declined. Had there been around 4000 in the year 1800, and 2500 in the year 1850, nowadays there are no more than 170 waterboards. One can see that the amalgamation of public institutions did not only involve municipalities. The number of waterboards declined most sharply in the past 20 years.

This is closely related to the second great change, namely a change of landscape. After 1650 it took 200 years before a new period of land-reclaim^{reclaim} began. The enormous Haarlemmermeer (in the north of the province of south-Holland) was reclaimed and turned into a large polder in the middle of 19th century. The 'Wijkermeer' and 'Y' were reclaimed between 1866 - 1876, and a large canal was dug in that area (the Northsea-canal). The 'Zuyderzee' was cut off from the Northsea by means of a large dyke connecting the provinces of north-Holland and Friesland (1930's of 20th century). At about the same time the Noordoostpolder was created, bordering the provinces of Drenthe, Overijssel and Utrecht. The Deltaworks, the last of the great waterworks, have already been mentioned.

As one can easily understand, the above-mentioned major waterworks could not have been engineered without substantial support from central government. This constitutes the third major change, related to central - local (i.e. waterboards) relations. Up to the beginning of the 19th century the Dutch waterboards had enjoyed a great autonomy. The first step in tightening relations with central government occurred during the time of the French Occupation (1795 - 1813). A department of water-control was created in 1799 (Alkemade, Raadschelders, 1988) as well as a National Water Institute invested with the task to control major works. From then on a distinction was made between 'main system' (sea-bordering areas, dunes, main waterways), 'regional system' (smaller rivers, larger inland dykes) and 'local system' (the polderboards). Each had their own task, albeit there was not yet a well coordinated structure. Well into the 20th century the Dutch water controlsystem with technological and institutional arrangements at the local up to the national level, remained largely a public-private (or is it: private - public?) enterprise, regulated by law, but not constitutionalized. This has changed in the past twenty years. The old laws (1895, 1900, 1979) on water control government, have been supplemented with laws for specific tasks (pre. water-pollution). In the next two years the entire existing body of law on government and task-performance of water control systems will be surpassed by new acts that firmly tie the waterboards with other governmental bodies and levels. What's more, in the last constitutional amendment (1984), waterboards have been formally recognized as and elevated to the status of being a body of local government (specific purpose government). From now on

watarboards are one of the components in a large planning-structure concerned with the control of:

- quantity of groundwater;
- quality of groundwater;
- quantity of surfacewater;
- quality of surfacewater.

This water control planning structure is closely related to the planningstructures for a) environmental policy and b) spatial planning.

The present interdependency between technological and institutional arrangements within water-management and between water-management and other policy-fields is thus of recent origin, and is a consequence of the fourth great change that has taken place.

The two oldest tasks of waterboards were dyke-control and water-supply (quantity). Less important was the control and upkeeping of roads on top of the dykes. This has been so unto the 1960's. During the sixties of this century people became aware of the importance of a clean environment. Such awareness originated in the 19th century lobbies to create 'running-water systems' and 'sewer-systems'. This though was mainly a municipal enterprise. Care for the larger environment, perceiving it as three separate but interlocked ecosystems (air, land, and water), did not occur on the policy agenda after pressure by interest-groups. Several private organizations were erected, national as well as international (Greenpeace). One of the results of this 'environmental movement' was an official government policy, culminating into the Act on the Pollution of Surface-water (1970). In the seventies a separate government-department for the environment was created.

This brought an important change in the institutional setting. Because of the Pollution-Act, Water Waste Treatment Authorities (from now on: WWTA) were installed. In some cases the area of a WWTA (considered to be a special type of waterboard) coincided with that of a High Waterboard, thus having one administrative apparatus. In other cases a WWTA was separately created encircling a large area with two but most more (not yet amalgamated) waterboards. And again, in other cases a WWTA wa created as a component of the provincial government (like in the three northern provinces). The contemporary pattern of institutions involved in one way or the other with water control, is therefore highly complex and in a certain way comparable with a fragmentation- or differentiationsystem (ACIR, 1987). This institutional fragmentation results in overlap in terms of task-execution. It is being said that simplification of this structure would enhance its efficiency and efficacy, although this is not supported by empirical evidence. The idea of simplification is deeply rooted in the Dutch idea of a decentralized unitary

state (Toonen, 1987). Much is to be said for the counter-argument that the catchment-area of a task ought to be the leading principle in constructing external task oriented institutions. It is clear that the economy of scale in which a polder operates is (much) smaller than that of a WWTA.

The second change resulting from the creation of WWTA's has to do with the representivity of the water-management. For centuries the boards had been controlled by landowners, they were the sole beneficiaries of this CPR. Water-administration was ruled by the triad "interest, taxation, representation". Clearly the farmers had an interest in water control, paid land taxes and provided the necessary means to build waterworks, and hence enjoyed the right to be represented. Non-landowners and inhabitants of the cities and villages were excluded from influence. This has changed dramatically. Up to the late ^{1970's} seventees the land- and watertax was the main source of income of the waterboards. Since then this tax is greatly surpassed by the so-called 'pollutiontax', of which the total amount quadrupled in less than 10 years (1979 - 1986). Main contributor of the pollutiontax is the individual household, since they are the greatest producers of foul water (far greater than industrial plants for instance). At present 70% of the total income of waterboards comes out of the pollutiontax. Referring to the above-mentioned triad, this means that citizens in towns ought to have influence in the water-management. And, indeed, the changes in the near future of the legal structure provide in a representation of householders to be elected via the members of the Municipal Councils. This could mean that polderboards become subject to political intrigue and power-politics, since it is the political parties from which household representatives in a polderboard will be recruited. This politization is not welcomed by the original users, the landowning-farmers.

This short introduction of the development of the Dutch water control system reveals similarities with other corporate structured analyzed in the 'Common Fool Resource Project' of the 'Workshop in Political Theory and Policy Analysis' at IU-Bloomington (from now on: Workshop).

In the past 1000 years one can recognize several action-situations, as well as (naturally) differing rule-configurations. So far, Dutch water control systems have only been investigated within the academic fields of either the 'technological' or 'constitutional-law' disciplines. Indeed, studies that reveal a different (social-science, historical) approach are almost nihil. It is my firm belief that a research-project that will use - and if necessary: adapt, amend - the models developed in the CPR-project (Kiser & E. Ostrom, 1982; Oakerson, 1986; E. Ostrom, 1985, 1986 a-f) not only will shed new light on Dutch water control, but will also constitute a major change in the evaluation of changes

that have been indicated above. What's more, the attractiveness of the CPR-project lies in its comparative and developmental approach, enabling us to trace common features in the administration of such differing CPR's as can be found in meadows, fishing areas, woodlands, wildlife areas, irrigation-areas, mountains etc. Complemented with a Dutch case, spanning a millennium, the CPR-project can profit in terms of further understanding of CPR's as well as further clarification of the concepts used.

2. GENERAL RESEARCH QUESTIONS AND EXPLANATION

a) How did the High Waterboard of Rhineland evolved over time in terms of tasks, organizational structure, and functionaries?

I propose to investigate one large High Waterboard in the province of South-Holland, Namely Rhineland. The choice of this case is relevant. Rhineland is composed of several inlying waterboards. The inlying boards were originally independent, and became part of the High board in the 17th century. The inlying boards conduct tasks in the field of water supply regulation; the High board has a specific task in coordinating the inlying boards concerning the in- and outlet of water, as well as being a WWTa. The polder 'Haarlemmermeer' is part of the High board of Rhineland, so this area has had a major land-reclaim.

I propose to do a major archive research in order to collect necessary data on tasks, structure and (number of) functionaries. The High board of Rhineland is in possession of a well-preserved archive.

b) How did the High Waterboard of Rhineland developed through the ages in terms of action-situations and rule-configurations?

As a case-study it suits exceptionally the needs of the CPR-project, since it has had waterboards since the middle ages, and went through all of the changes mentioned in the introduction.

The administrative seat of the High board is in the city of Leiden, and I am acquainted with this High board (see C.V.).

c) In what respect(s) can (dis)similarities be identified in the development of this High Waterboard as compared to:

- other water control systems, and
- other common pool resource systems.

Acknowledging and stressing the importance of comparative research, which i.a. involves an 'ovreall' and generalizing body of theory, the results of the Rhineland case will be compared with other CPR-systems.

d) How is the forthcoming change in the constitutional, collective and operational choice levels of Dutch waterboards to be evaluated in terms of efficiency and efficacy?

Contemporary developments in the legal and planning structure of Dutch water control systems, as indicated above, constitute a major change. It is my intention to evaluate the merit of these changes, in establishing whether it has been for the better or for worse. The policy relevance of this particular question is, however, not limited to the evaluation of the efficiency/efficacy of the new system, but also challenges the common feeling in the Dutch political system that a unified, more or less centralized governmental structure is the only answer to myriad needs and wishes. I will therefore compare this new action-situation with older, historical examples.

3. FRAMEWORK OF REFERENCE

This case-study will draw heavily upon the models and theories that have been developed by the 'Workshop', and is characterized by concepts such as action-arena, jointness, exclusion, rule-configuration, constitutional, collective and operational choice levels, user-group etc. When reading articles and papers kindly provided by the 'Workshop', I continuously could relate such concepts to the Dutch situation. So far, I find the used concepts illuminating in the sense that they establish a new and relevant way of looking at the structure and functioning of Dutch water control systems in the past and the present.

4. RESEARCH TECHNIQUE

As indicated above I will study archival material that is present at the High Waterboard of Rhineland, the Archive of Leyden, the archive of the province of South-Holland and the National Archive. I expect that this will generate hitherto unknown facts about the development of Rhineland as a waterboard. This information will naturally be supplemented with a study of existing literature on technological and legal developments of waterboards in general and of Rhineland in particular.

The acquired data will be structured in accordance with the coding forms devised by the 'Workshop'.

5. EXPECTED PUBLICATIONS

- one article on the theory and methodology of the CPR-project, since it is virtually unknown in The Netherlands and most Workshop-papers will not be available there (Dutch);
- one article on the technological and administrative

- development in general of Dutch waterboards from the high middle ages up to the present day, with attention for types of soil, institutions etc. Maps will be included, special attention shall be given to Rhineland (English);
- one article on the development of Rhineland as a CPR-system in terms of task, organization and personnell; special attention for changes in action-arena and rules (English);
 - one article to compare Rhineland with other (dis)similar cases (English);
 - two articles concerning an evaluation of present changes. One will be written with a special focus on the CPR-project (English), the other will be written with a special focus on Dutch policy-makers in this field (Dutch);
 - (possibly) one article on theory and methodology after completion of the Rhineland case, reviewing and if necessary further refining the models and theories of the CPR-project.

6. CURRICULUM VITAE, RESEARCH EXPERIENCE

I graduated in 1982 at Leiden University with a major in history, and minors in public administration and international relations.

Since 1983 I work at the Department of Public Administration of the same university. In the past five years I have been working on the completion of my PhD-thesis on local government development in The Netherlands since 1600. More in general I am well acquainted with literature concerning local government development in western nations (general and specific purpose). I derive my knowledge of that topic from different perspectives as administrative science, history, legal theory, political theory and sociology. I have great experience with archive-research and paleaography.

A list of published, forthcoming and submitted articles/chapters is added. They concern topics as police, government and education, coproduction, elites, urban problems, philosophy and methodology of science, decentralization and local government development.

My education responsibility in Leiden is Mainly 'Binnenlands Bestuur' (i.e. Dutch administration from the local up to the central level), including waterboards.

Presently I give an undergraduate course at SPEA, IU-Bloomington on 'nation-state development, sovereignty and international relations'. Also, two seminars on local government development have resp. will be presented.

I regard the CPR-project as challenging in terms of getting acquainted with a new approach, an attractive opportunity to get involved in a comparative research project and a chance to enlarge my own knowledge of (Dutch) water control systems.

Jos C.N. Raadschelders SPEA, Bloomington, sept. 23, 1988.