

## Then as now: clean water and dry feet

### A historical town atlas as time machine for use in modern climate adaptation data analysis

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**Keywords:** *Historical city maps — Historical GIScience — Climate adaptation strategies — Urban adaptation — Integrated knowledge*

**CHNT Reference:** Kosian, M., van Lanen, R. (2022). 'Then as now: clean water and dry feet. A historical town atlas as time machine for use in modern climate adaptation data analysis', in CHNT Editorial board. *Proceedings of the 27th International Conference on Cultural Heritage and New Technologies, November 2022*. Heidelberg: Propylaeum.

DOI: xxxxxxx.

## Introduction

Urban living in a low-lying delta is part of the Dutch identity. From the seventeenth century onwards the positive philosophy of “*God created earth, but the Dutch created Holland*” seemed to be the foundation for Dutch dealing with their environment. From the fourteenth century cities in the western peat areas of the Netherlands (especially the county of Holland) originated next to small rivers and canals dug to reclaim the land. These waterways provided both (drinking)water as transport to the rapidly growing cities. But due to the settling peat causing soil subsidence, and extreme weather due to the seventeenth century’s climate change (Parker 2017) these new urban centres face comparable problems as their modern counterparts.

In this paper we will show how historic data and knowledge can be integrated into modern policy making in order to create solutions that are not only of high engineering quality, but also fit in with the historical regional characteristics. The Historic Town Atlases can be instrumental as a way to provide insight into historical adaptations and developments in urban water strategies.

## Cities in the swamp

The oldest cities in the Netherlands arose along water courses. The earliest urban centres were founded in Roman times next to either one of the rivers Rhine, Waal or Meuse, or the newly dug Corbulo-canal. Especially the river cities knew a persistence after the Roman period into the Middle Ages. Their position along a main waterway was of course the reason why they could maintain their importance. The river, after all, provided water, protection and transportation links. Most of the rest of low-lying the Netherlands was hard to impossible to pass through (van Lanen 2017). Small corridors of higher ground could be used as transportation axis, and even then, only in dry seasons. Only the high beach barriers and dunes and the Pleistocene areas in the eastern part of the country were

accessible all year round. From the tenth century new cities arose along the rivers IJssel, Waal and Merwede. The IJssel river was formed after the Roman period and gave a new route via the also newly formed Zuiderzee to the Baltic and northern German cities.

The eleventh century saw the start of the great peat reclamations in Holland. Miles of canals were dug to enter the peat areas and start the reclamations. These new waterways also formed an elaborate network for potential transport, triggering the rise of new cities in the thirteenth century. These cities rapidly grew to the commercial centra of Holland and indeed the world (Rutte and Abrahamse 2016).

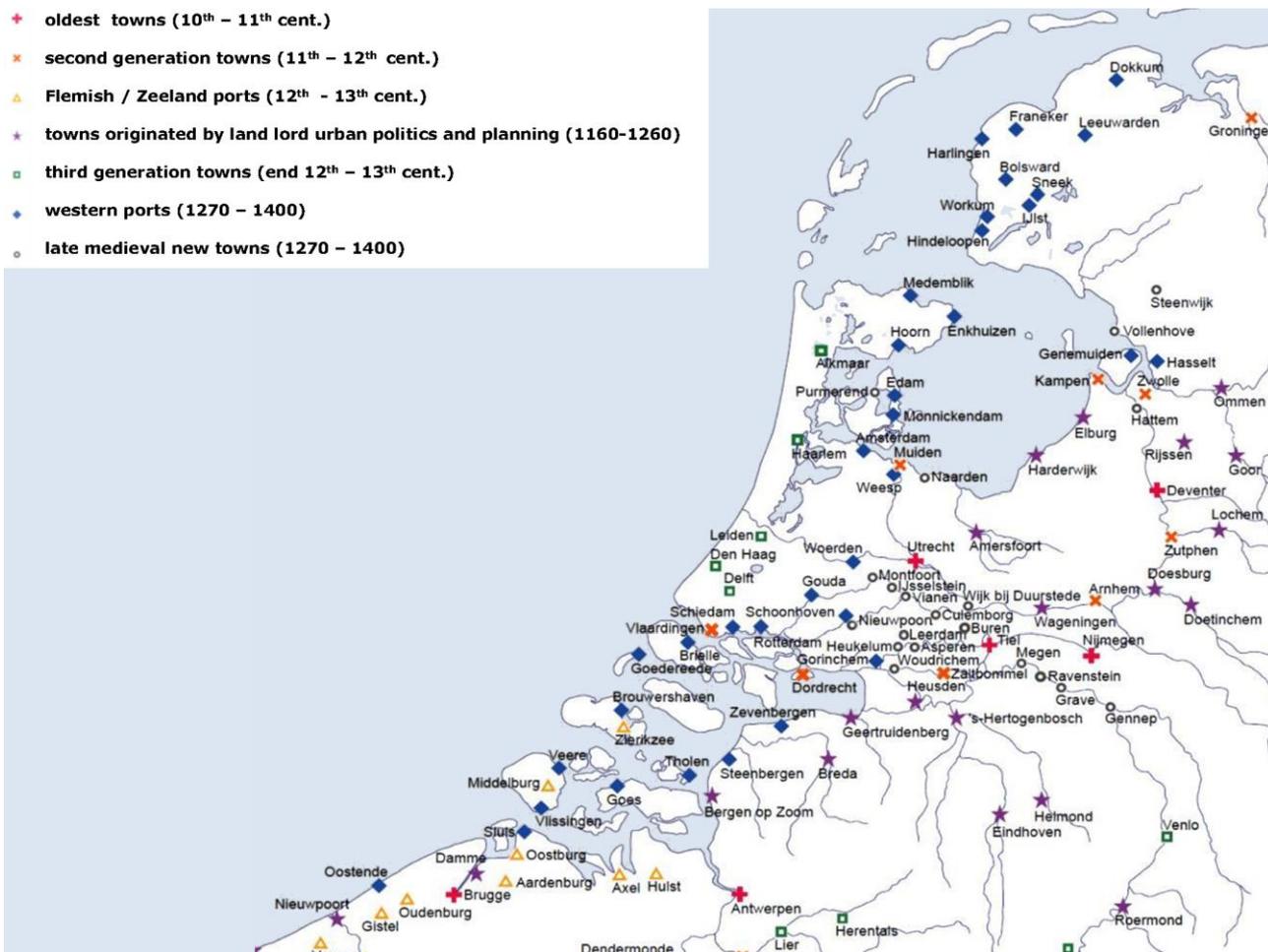


Fig. 1. Medieval town origins in the Netherlands.

These new cities not only were situated next to waterways, but were also build in formerly inaccessible, low-lying peat areas. Areas that, due to both reclamation as well as peat extraction for fuel, were prone to soil subsidence and flooding. The new, rich merchant cities therefor had to adapt early in their existence to these dangers. To add to these factors the subsequent centuries also knew a period of climate change, resulting in extreme weather events. Climate adaptation strategies and surplus water management therefor are of all times. When modern municipalities have to develop these policies they should use the ideas, knowledge and data of their predecessors. This not only will guarantee a local characteristic solution for that specific town or area, but also, as being local, a sense of self with the inhabitants, giving a basis for citizens support.

## A time machine to show change and persistence

The national government in the Netherlands had defined two major overall strategies for adaptation and development. One is the Deltaprogram Spatial Adaptation<sup>1</sup>, and the other the National Environment Perspective<sup>2</sup>. Since the execution of these programs lies mainly with the provincial and local governments it is of the utmost importance to provide a good knowledge base for these governing bodies to build their plans upon. The Cultural Heritage Agency has in recent years made a myriad of data sources and GIS map Layers to provide this kind of historical information (see for instance Kosian and van Lanen 2018). Dataset specifically useful for urban planning and transitional strategies are for instance the detailed “Nederland in 1575” set, depicting the city plans of Jacob van Deventer<sup>3</sup> in vector GIS within a land use / landscape reconstruction of the Netherlands at the end of the Middle Ages. For the following period, the Dutch Golden Age with the rise of the merchant cities of Holland there is the dataset “Nederland in 1650”, depicting the city plans of Joan and Willem Blaeu<sup>4</sup>, also in vector GIS and within a land use / landscape reconstruction of that period. The Netherlands also know the HISGIS project in which the first cadastral maps of the Netherlands (1832) are being digitized and published as a vector GIS on internet.

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<sup>1</sup> The Deltaprogram Spatial Adaptation (Deltaprogramma Ruimtelijke Adaptatie, 2018) aims at seven main ambitions: know the vulnerability, make a risk assessment and strategy, make a good realization agenda, pair climate adaptation with other transitions and societal tasks and problems, stimulate and facilitate local initiatives, control and secure these initiatives and adaptice solutions, and finally have a plan for action for calamities.

<sup>2</sup> The National Environment Perspective (National Omgevingsvisie, 2022) describes the societal tasks and problems and the, to be protected, core qualities of a municipality or province. In the Environment perspective, numerous interests are compared, from soil to air, and approached integrally. By taking the past as a starting point for future ambitions, a clear, integrated and appealing plan can than be made.

<sup>3</sup> These plans were made between 1545 and 1575 and published in three volumes, presented to the king, Philip II of Spain under the title *Planos de ciudades de los Países Bajos*, Plans of the cities of the Netherlands.

<sup>4</sup> These plans were collected and published by the Amsterdam cartographer Joan Blaeu in 1652 in two volumes, titled *Toonneel der Steden van 's Konings Nederlanden, met hare Beschrijvingen*. Scene of Cities of the Kings Netherlands, with their descriptions.



Fig. 2. Map of building phases in Amsterdam, also showing the real estate values for the newly developed (mid 17<sup>th</sup> century) Canal zone.

Next to that many diachronical datasets are being developed, often on modern transitional themes, like palaeogeographical reconstructions of the Netherlands, depicting the formation and transitions of the Dutch natural landscape, historical dikes and *wielen*, pools originated due to breached in the dike, and a hydraulic long-term system analysis, depicting the discharge of the lower Rhine and the adjacent polders from 1600 until the present day, with all the corresponding water courses and engineering works.

Although these data sets are available as webservices, and presented in thematic viewers, it is for local users still difficult to combine these sources and make a customized local HGIScience<sup>5</sup>. Such a local urban HGIScience can give insights in trends and transitions over time, coupled to the present-day urban layout and buildings. Especially for the historic urban centres the nineteenth century cadastral maps give not only a link to the modern cadastral situation and city layout, but also provides a recognizable link to previous periods. From the earliest cadastral maps it is often very good possible to identify most of the buildings from eighteenth century pre-cadastral maps and from there on further back. This of course is the concept of the European Historic Towns Atlases. This concept lends itself to be the basis for local urban HGIScience systems. Since the atlases for many countries reach their completion, the next step would be the digitized, webserved, online version so that

<sup>5</sup> The concept of a diachronical, thematic, multi-disciplinary Historic GIScience (HGIScience) management information system is described in Van Lanen, Van Beek and Kosian 2021

municipalities can make their own digital time machine, combining multi-disciplinary data. This way long-term trends can be perceived and plans and visions can be drawn up including historical, local characteristic and system-persistent aspects.



Fig. 3. Change and persistence of the watercourses in Amsterdam. Comparison between present day (aerial photograph), Golden Age (Blæu, 1652) and Middle Ages (van Deventer, 1560/61)

## Conclusion

Although the European Historic Towns Atlases project was started in 1955, the concept of documenting the changes and development of European towns and cities from the Middle Ages to the present day, is still valid today. Were it started in the ruins of the Second World War, providing historical information for the transition task on hand, i.e. rebuilding the towns and provide housing for the people after the war, while maintaining the characteristic values. The present-day transitional tasks, like climate adaptation, energy transition, and, again, housing, require a likewise concept. With the introduction of modern GIS technology and HGIScience information concepts the Historic Towns Atlases concept looks ideal to function as a framework in which these transitional plans and visions can be developed. Although the step of digitization to GIS readable formats must be undertaken it would provide a good base for continuation of the project for the future. After all, urban transitions and maintaining historical values will be from and for all times.

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