



≡ The Industrial Zaanstreek

Traditional Water Systems
The industrial landscape and trading
water network of Zaanstreek

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Figure 1: A Glimpse on the Voorzaan

Context.

Location: Zaanstad, North Holland, the Netherlands
Landscape Type: Polder-Boezem landscape
Area: 8,324 ha (originally).
Function: Draining and infrastructure
Water Quality: Fresh and Brackish water.
Dynamic: Controlled

The research area is Noord Holland province, specifically the Water Authority of Hollands Noorderkwartier. The old reclamation history creates the catchment area divided by the boezem systems. The west area is connected as a whole; the east part is independent of the Schermeer boezem due to the direct water discharge from polders into outer water. Zaanstreek is situated at the south end of the whole system and well connected to Amsterdam.



Figure 2
Netherlands

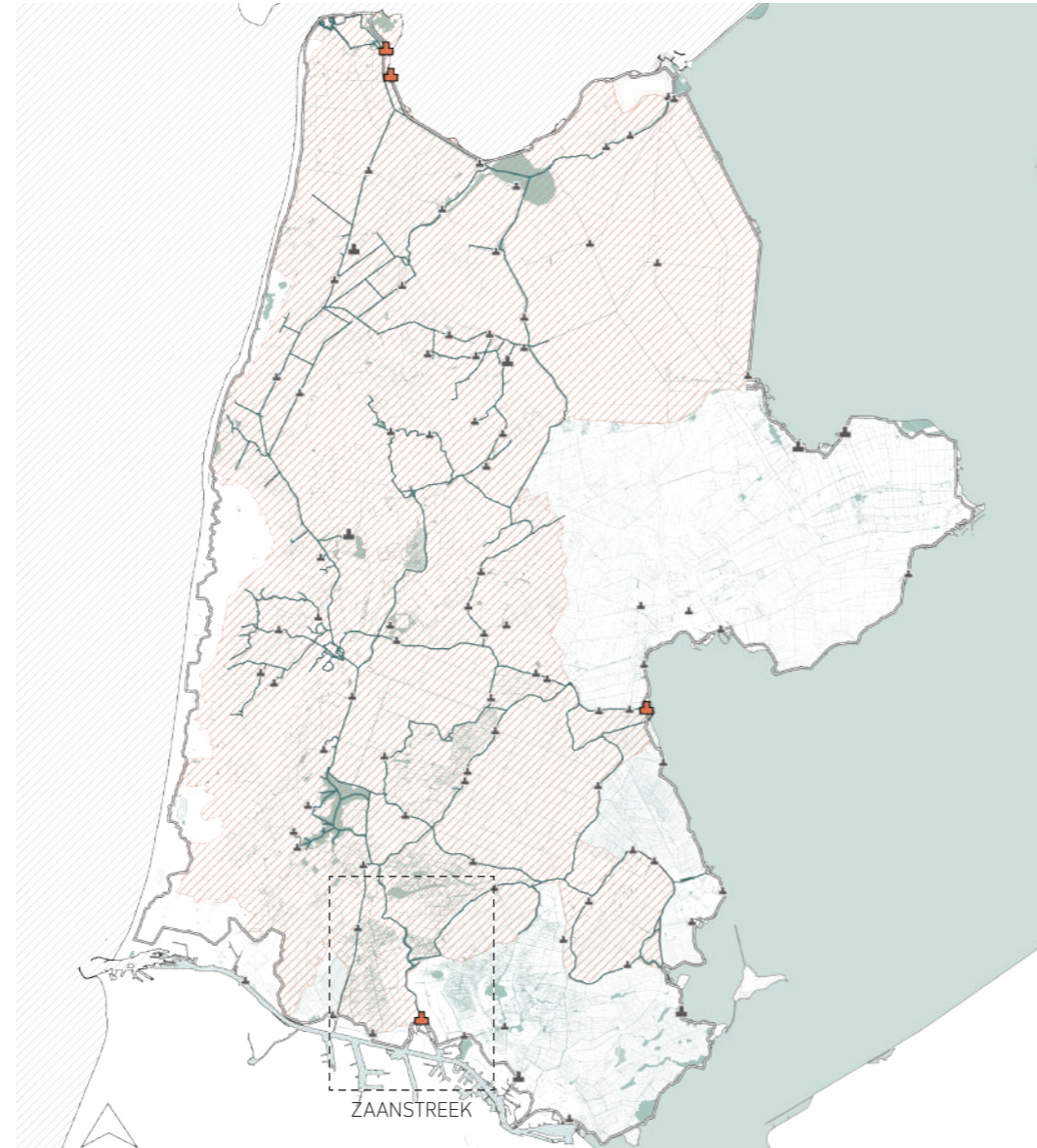


Figure 3
Catchment area of Hollands Noorderkwartier



Figure 4
Zaanstad in current situation

Climate.

Climate zone: maritime climate
 Sub-climate: maritime climate

Climate & Weather Averages

High t°: 23.8°C
 Low t°: 0.7°C
 Mean t°: 10°C
 Precipitation: 800 mm
 Humidity: 77%
 Dew point: 10°C
 Wind: 7.3 km/h
 Pressure: 996.4 mbar
 Annual Rainfall: 800 mm per year

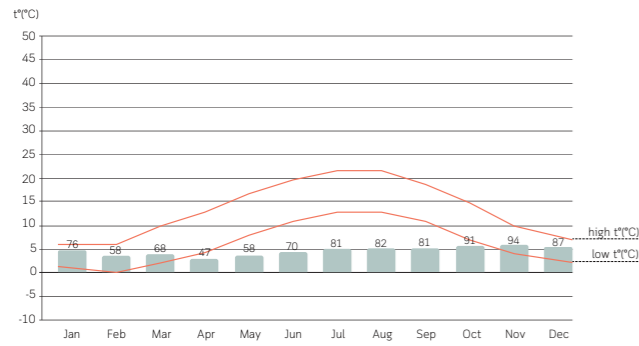


Figure 5
 Temperature and amount of rainfall

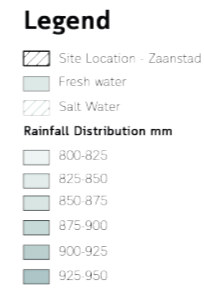
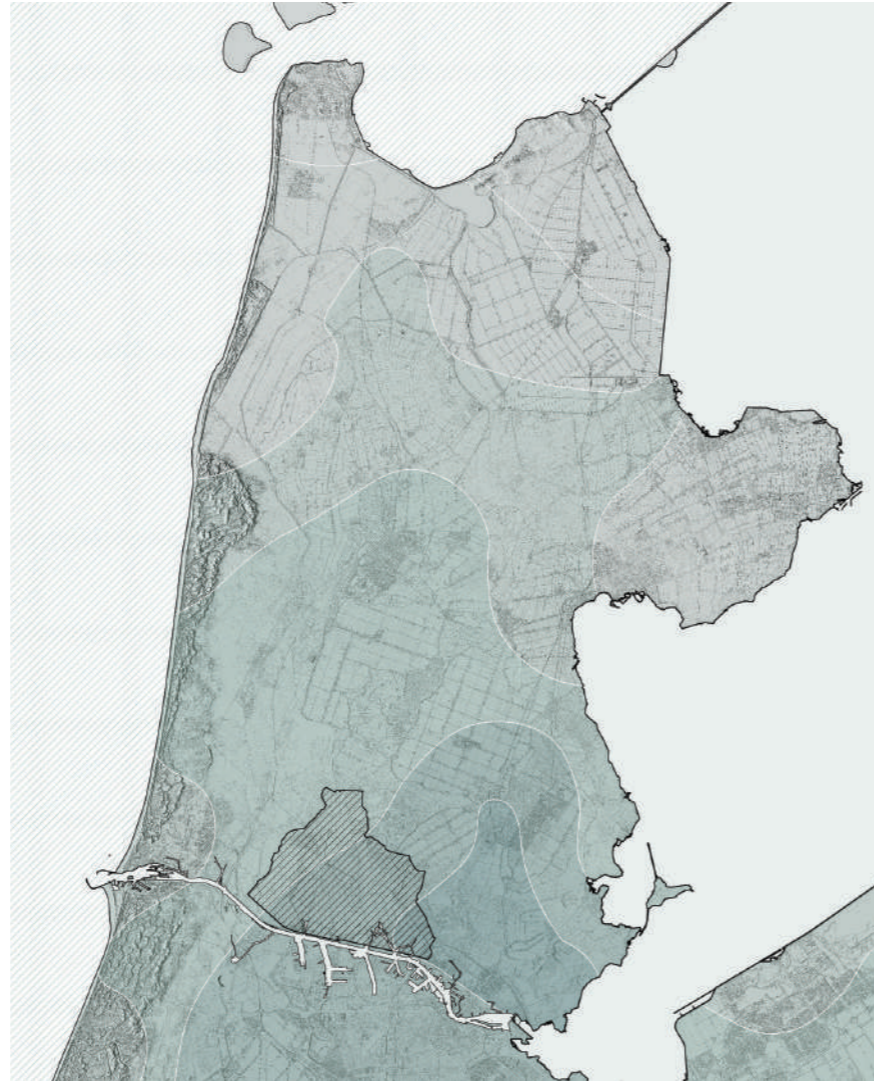


Figure 6
 Rainfall distribution of North Holland

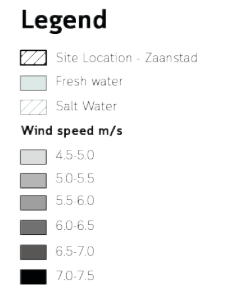


Figure 7
 Mean Wind Speed map of North Holland

Landscape transformation.

The transformation of the North Holland area is drastic. Due to the peat bog reclamation and excavation, the land has been drained for centuries which caused significant subsidence. The ribbon village, the Peat river town, and the polder water system formulate the basic character of the area.

Furthermore, because of the subsidence and the re-wetting of the land, it was unsuitable for growing crops. Thus, the locals started to find another job for a living: fishing. After generations, they became merchants and business man. In this time, many cities has emerged alongside the dikes.

Phase 1: From the early middle ages, the peat moss in west Friesland grew into a thick layer, and the bog rose above nowadays NAP 4 to 5 meters.

Phase 2: The ditches that were dug in a certain size. The average distances between ditches are 95 to 115 meters (Kwaad, n.d.-b) to cultivate the land and make it dry enough for cultivation.

Phase 3: Following the primitive landform, the village dwelled at the end of the drainage of patches, and the land continued to subside.

Phase 4: After the subsidence lowered the sea level, a large amount of land was flushed into the ocean due to severe several storms; from the 13th century, the Zuiderzee and the inland lakes were formed, which is connected and influenced by the tide.

Phase 5: Eventually, the local communities had to decide to close the inland with dikes. That is the formation of the dam cities. Also, windmills were introduced to pump the water out, created polders. They also drained the lakes into polders. The Polder-boezem system thus completed.

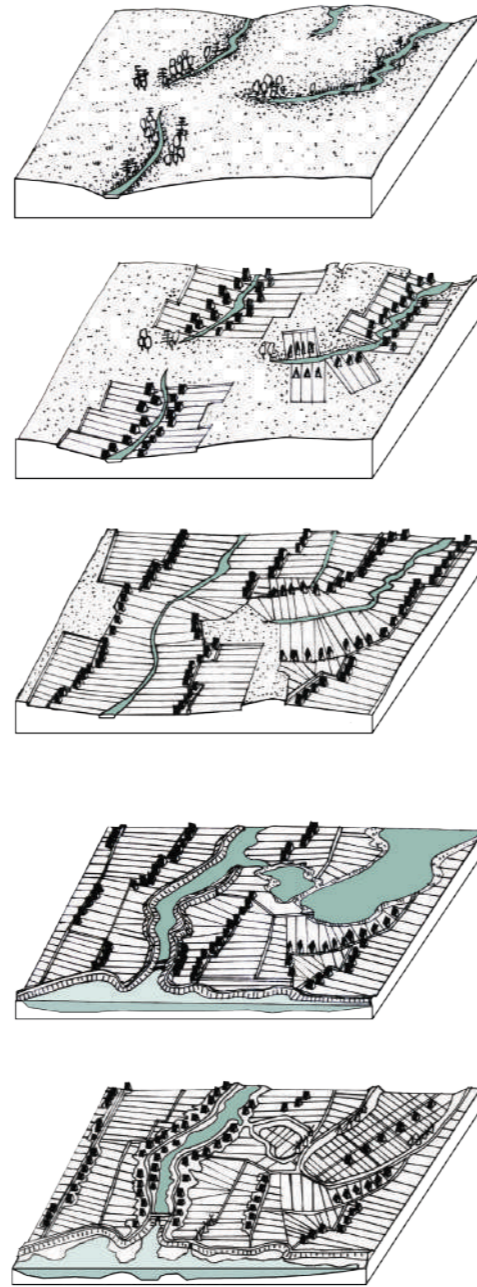


Figure 8
The transformation of landscape in Zaanstreek area

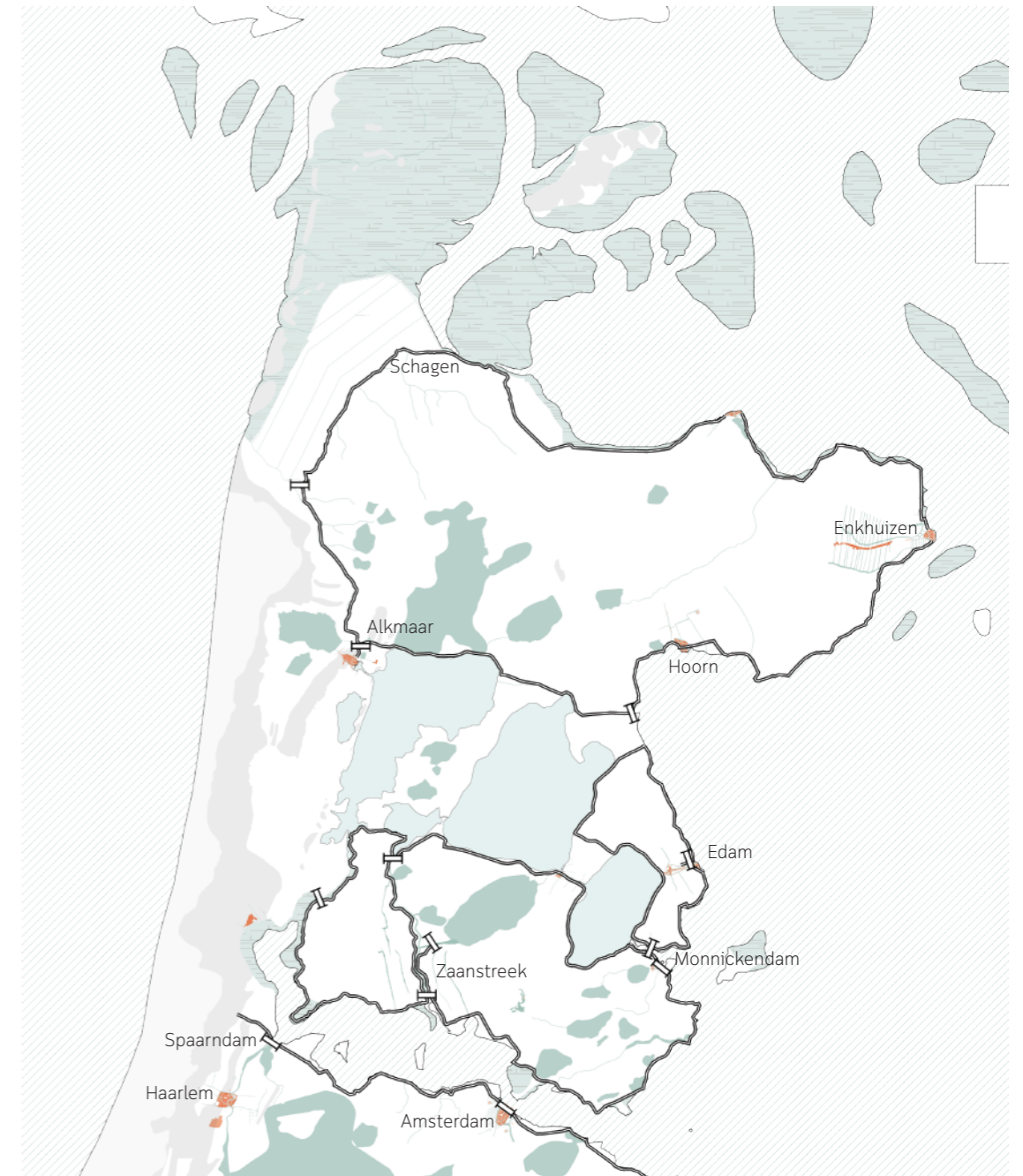


Figure 9
Water system in North Holland before 14 century

Human Interaction.

Zaanstreek is famous for its industrial history. Thousands of windmills were standing in the landscape, spinning and producing great sounds. With the city of Amsterdam's economic boom, Zaandam benefited from it, become its most competitive rival and cooperator. In the 16th to 17th centuries, the industrial landscape emerged. Goods and ingredients came from over the world (mainly from the Baltic sea, also inland shipping), the factories that processed wood, grains, oil, canvas, shipbuilding, baking, papermaking, and whale hunting. Among these industries, wood manufacturing and shipbuilding were the most influential, bringing enormous profits to the Dutch Republic and Zaandam.

Eventually, Due to the newest shipbuilding technology and successful trading won the reputation of the Dutch Republic, it attracted foreign buyers to order their ships here. This industry drives the development of other industries.



Figure 10: The activities alongside the Zaan river (Top left).

Figure 11: Zaandam as a wood trading port (Top right)

Figure 12: A glimpse to the VoorZaan area and its busy activities (Bottom).

International trading.

Globalisation could start earlier than we thought; the first system was the "Hanze union" which connected those old medieval cities from the Baltic sea to the south until Antwerpen, this huge system was later invaded by the new order of trading. New cities rose to take the place of Hanza union cities.

Dutch merchants took advantage of this change and became the most influential force in the trading system; goods from the world flew into Amsterdam. During the dutch revolution, the economic centre moved from Antwerpen to Amsterdam. North Holland became the refuge and the free city in trading.

In this research, wood trading is the focus target; the resources came from the Baltic sea and west Germany, Norway and other cities. Nevertheless, the domination of Dutch merchants in forest products in the 16 century is apparent.

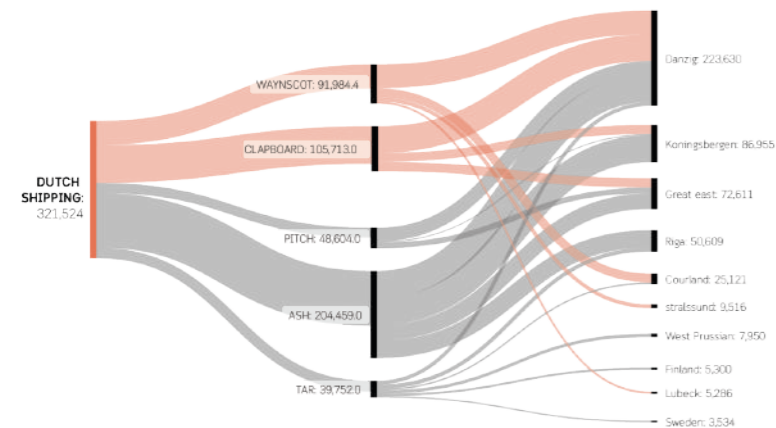


Figure 13 Shipping through the Sont in 1584 (Inferred valuation from 1584)

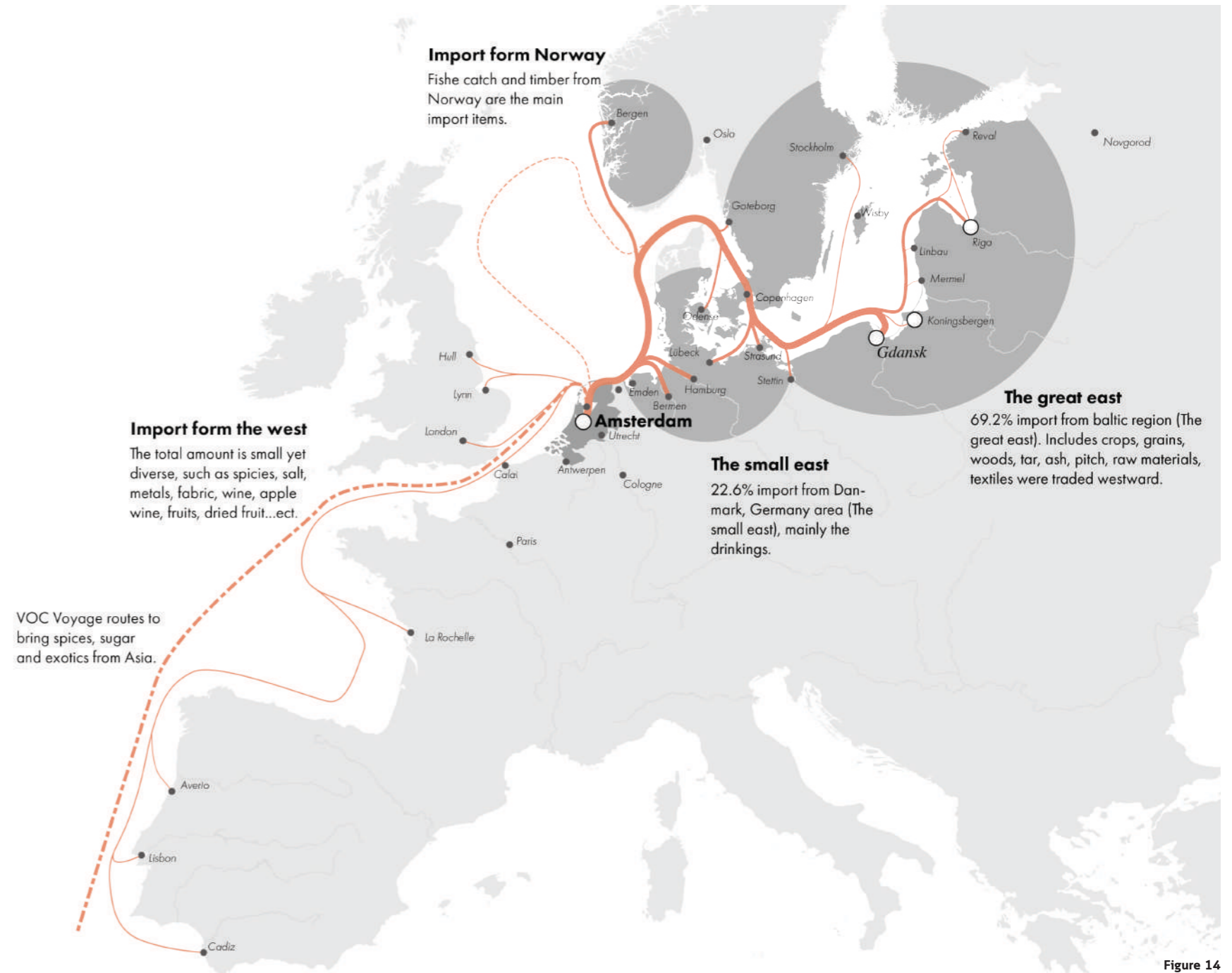


Figure 14 Baltic trading route in the 16th century

Regional Transportation Network.

Due to the depletion of timber resources in the Baltic Sea, timber supply gradually shifted to the Rhine, Ems, Weser, Elbe and other watersheds. Woods have been collected, bounded, and float in the river, all the way downstream and reached the harbour city, then been transported by ships, and barges.

In a domestic scale, the country's size water network connected cities and from the north to the south of the Republic. The "Binnenvaart" system already existed when the Boezem network was established in the late middle age. Goods came from the North sea and the Baltic sea sold, stored, and transported inland. Later, the "trekvaart" system appeared largely, according to De Vries., (1987), the system was dug to serve as punctative transportation mainly in 18 century. The trekvaart system later took over the transportation network of the whole Netherlands, and eventually became the accelerator of North Holland's economy booming until the implementation of the train system.

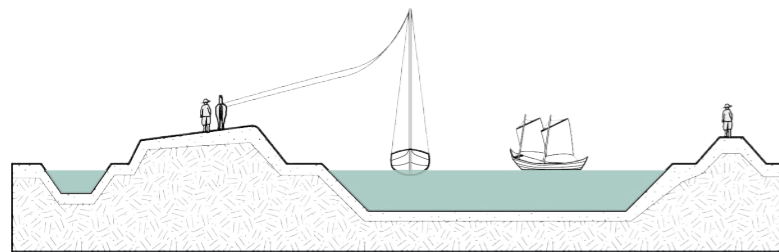


Figure 15
Section of the trekvaart system.



Figure 16
Domestic trekvaart system in 1665



Figure 17
Rhine river

Consequence on the Local Scale.

The introduction of windmills in order to gain the power to manufacture the materials made them semi-finishes. There are at least these industry that were here:

1. Wale hunting and oil production
2. Grinding/oil production
3. Wood peeling and sawing
4. Ship building
5. Canvas making
6. Paint production
7. Fabric production
8. Transportation
9. Fishing
10. Paper making

With the continuous wind provided by the North sea, this brought profit to this area, the water system was divided into two part by the dike. The outside of dike is the IJ, which is affected by the tidal and the large ships came from the international/regional places brought the good and material into the land. The Ij also used as connection between Zaanstreek, Amsterdam, and Haarlem.

Inner dike area was the polder water and Boezem system. Zaandam is a place where goods been auctioned and sold, later delivered to inland towns such as Wormer, Crommenie, Uitgeest, and Purmerend. The whole trading-production loop went on the fine-mesh like landscpae of Zaanstreek area.

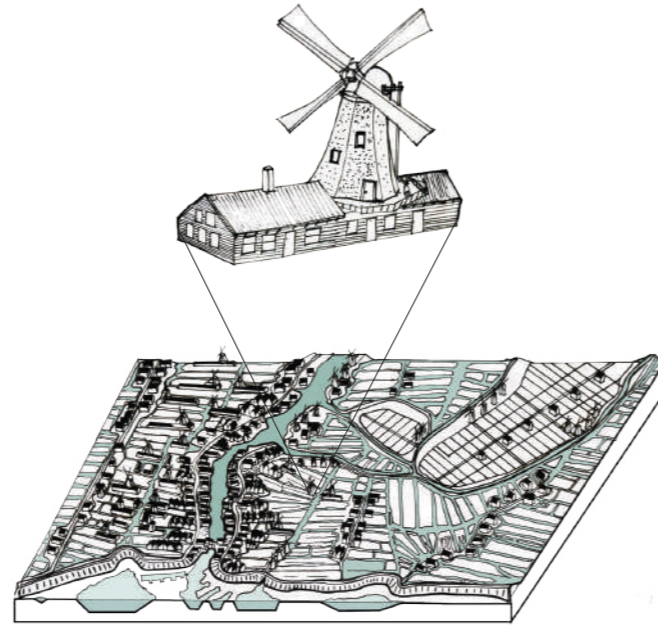


Figure 18
Diagram of industrial landscape in 17th century

- Legend**
-  Salt tidal water
 -  Inland fresh water
 -  Dikes
 -  Factory
 -  City blocks
 -  Ship building area

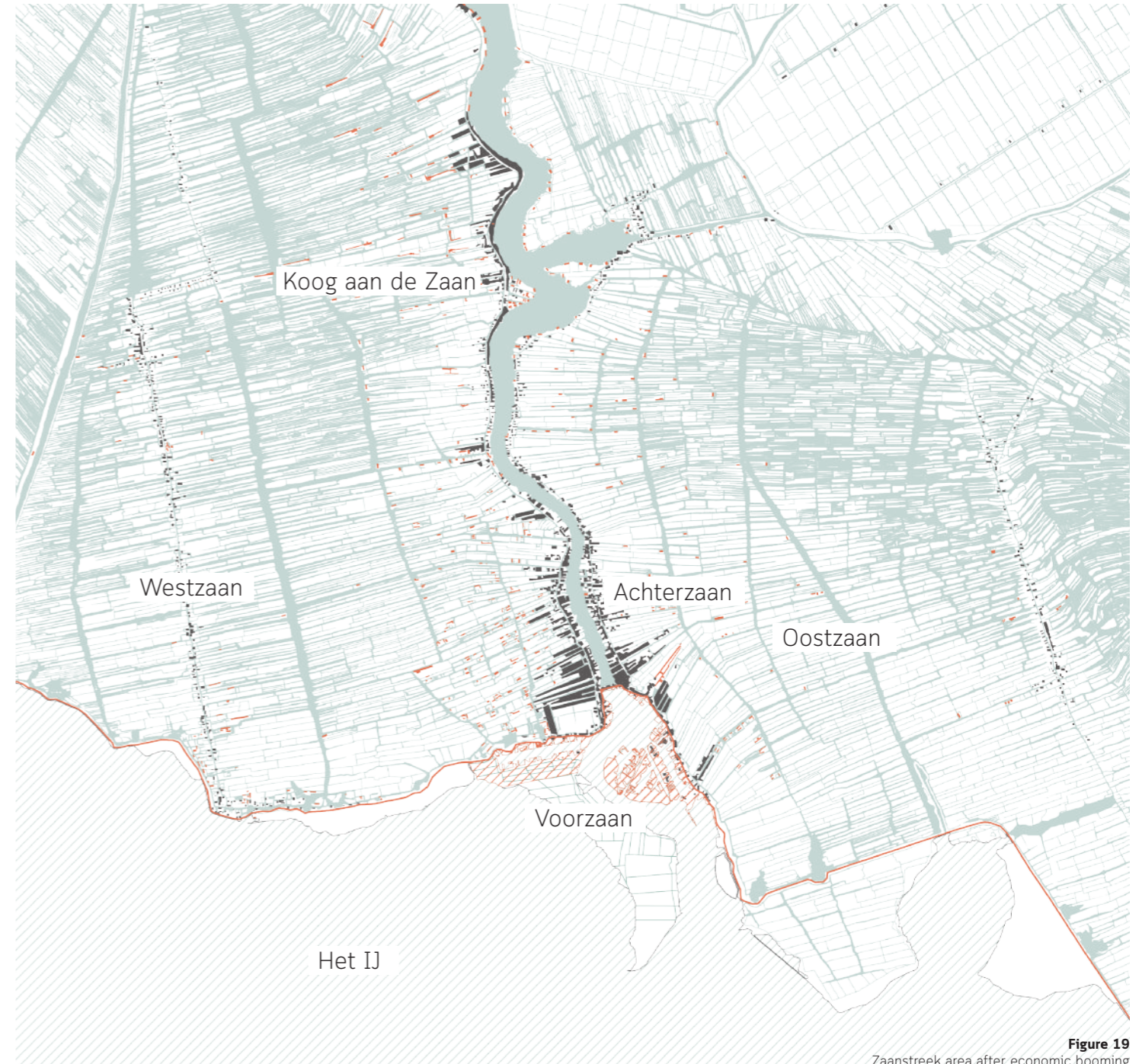


Figure 19
Zaanstreek area after economic booming

Water system.

Polder-Boezem landscape as a base of industry

From the start of the 16 century, the land around the Zaan was transformed into a busy industrial landscape, creating an enormous profit for the Republic and significantly benefiting the economy of both Zaandam and Amsterdam. The acceleration of the economic transition and landscape transformation due to three main reasons:

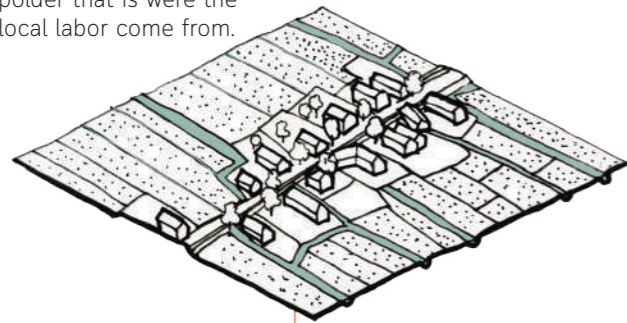
First, the rise of Amsterdam brought great opportunities to the Zaanstreek area, Zaandam took the geological advantage. In the golden age, Zaandam and Amsterdam could transport goods through the inland sea called the IJ, the short distance is the first reason these two cities flourished.

Second, The developed Boezem-Polder water network provides chances as a logistics and manufacturing zone for the merchants to invest. The broad places provide space to store, and the flatted land becomes the best place to build windmills and harvest the wind from the sea.

Thirdly, Social and political freedom gave the opportunities for workers and skillful immigrants to take rafuge in this area, which eventually brough cheap manpower but high quality of works to the market. Low manufacturing costs giving Zaandam a competitive advantage.

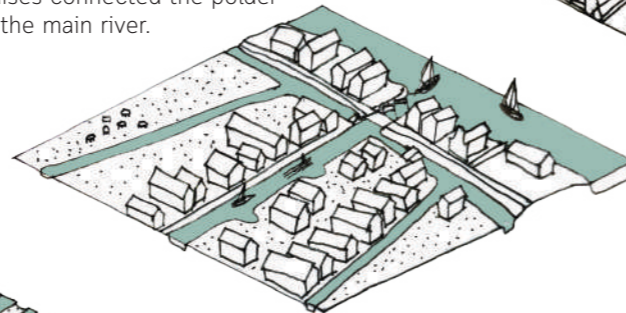
Ribbon village

The linear ribbon-like village situated in the polder that is were the local labor come from.



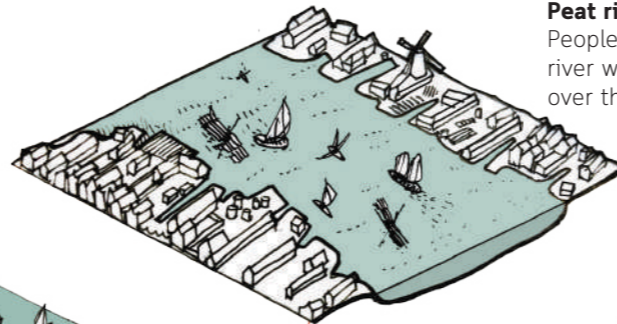
Sluises and Dwelling

The Township followed the pattern of polder, also the sluises connected the polder to the main river.



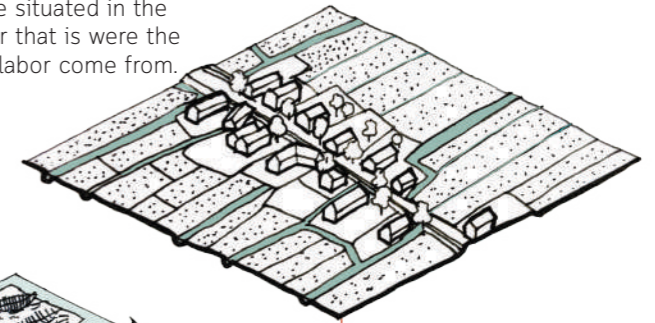
Peat river

People dwell alongside the peat river which is the highest point over the landscape.



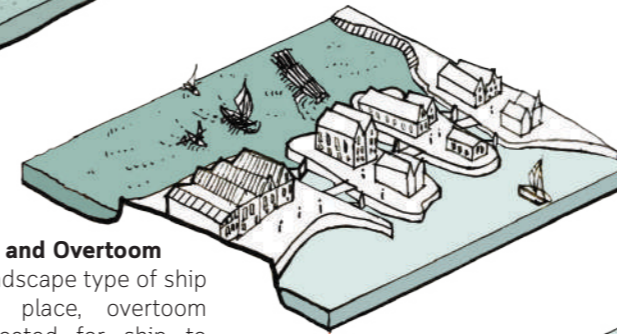
Ribbon village

The linear ribbon-like village situated in the polder that is were the local labor come from.



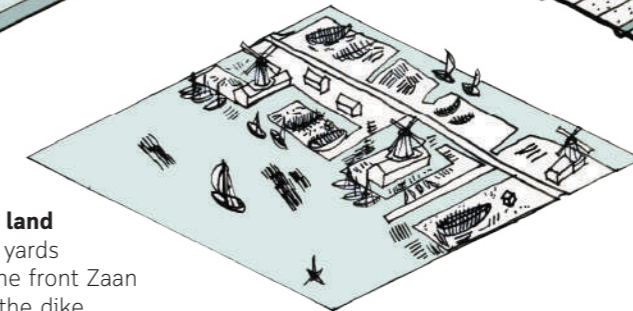
Sluises and Overtoom

As a landscape type of ship buiding place, overtoom was created for ship to cross the dike.



Ship building land

Factories and yards appeared in the front Zaan river, outside the dike.



Polder factory

The low-flat polder strips provides rooms for factories and storage.

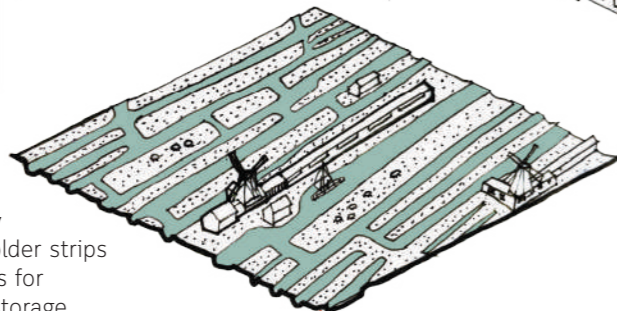




Figure 20
Bird-eye view and the landscape typology of Zaanstreek

Circulation.

Taking the wood/ship industry as a case to explain how the system works, the whole production circulation was strongly attached to the landscape. The process can be shown in steps:

1. After the wood had been brought into the Timmerrak, the front water of the dam, punting workers would punt the timbers passing through the sluices; sometimes wood was also brought by barges.
2. The sluices opened by humans. Ships and wood could float through it; the size of Sluis also determines the size of the ship that could be built.
3. The wood was sent to factories which were situated in the strips of peat lands. The wood was placed in the ditches for wetting before cutting.
4. Ship repairing as the first appeared industry still here in the 17 century; the wood was used directly in the polderland or alongside the Zaan river.
5. Wood boards again been brought by the barges outward to the Zaan river, shipped to everywhere.
6. Ship building was first after the dam. However, due to the ship size got too large to pass the sluices, most of the ships were built outer the dike, in the .
7. Overtoom was built to let the ship pass through the dam of Zaan. Many ships were slided to the outside and finalized in the outer Zaan.

Figure 21
Circularity of wood/ship industry

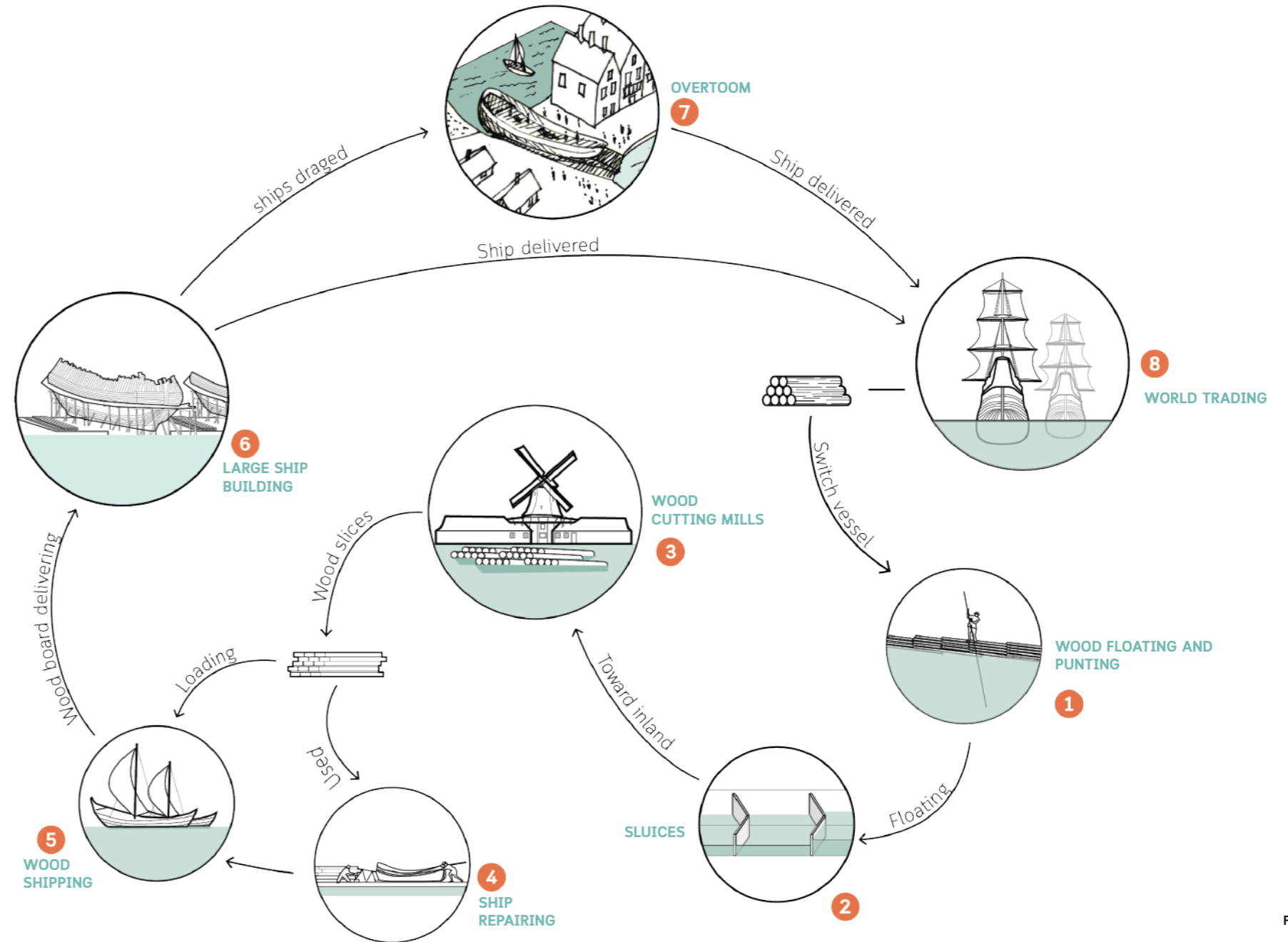


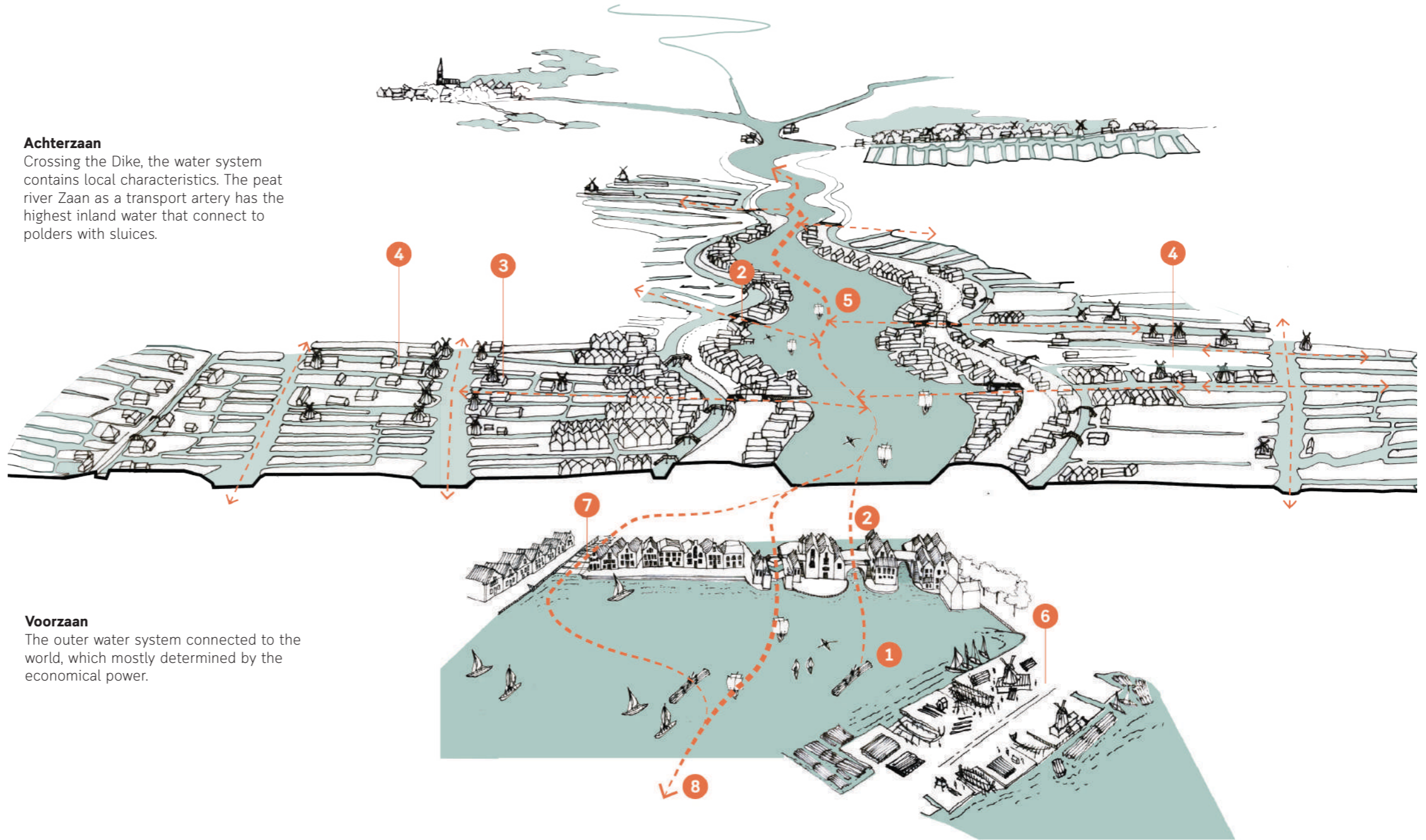
Figure 1

The emergence of the industrial landscape in the Zaanstreek area is a multi-causes history. The relationship between Amsterdam and Zaandam is special, they were competitors but also collaborators. The cheap cost of materials, transport and human power was the attracting forces for the merchants. According to the research, during the boom time, nearly 120 ships are built every year, and the price of each ship is about 28,500 gulden. It can be known that the cash flow involved in the shipbuilding industry is about 3.4 million Dutch guilders, that is, equal to 7,000 people's salaries (about 1 guld per person earned) And related industries must benefited from the shipbuilding industry.

After the shipbuilder made money, they turned to invest the configuration of equipment and sites. The shipyard on Voorzaan's homeland was the result of joint investment by shipbuilders. Finally, the shipbuilding industry mainly situated in the Voorzaan.

Achterzaan

Crossing the Dike, the water system contains local characteristics. The peat river Zaan as a transport artery has the highest inland water that connect to polders with sluices.



Voorzaan

The outer water system connected to the world, which mostly determined by the economical power.

Figure 22: The system of the wood related industry on the landscape

Conclusion.

Human and Nature composed the history of Zaanstreek together. The pre-modern economy activities and human living condition is deeply attached to the landscape. Zaanstreek constantly changed through time, there are several aspects that is specifically important:

Landscape value - Due to the environmental conditions, landscape value comes with the history written by humans and nature. The primitive peat bogs led the old Dutch people to cultivate and change the land uniquely. Due to land subsidence, the introduction of waterworks, such as dams, dikes, sluices, and weirs, which drastically changed the usage of landscape, formed the conical Dutch lowland scenery.

Function value - Based on the cultivated land, the lowering land pushed the Dutch people to change their lifestyle from growing crops to fishing. Later, Fisher became a merchant, transforming the polder-Boezem system into a network which connected local towns and cities. The amphibious culture created the industrial landscape in the Zaanstreek area. Landscape had a high function value in related to local and international economy.

Identity value - Zaanstreek, as the first industrialize place in the Europe, even earlier than the First Industrial Revolution in England. Leading the European world at that time, the “economies of scale” began to appear: Large-scale procurement (timber from international trade), factory specialization (barking, cutting, assembly), “Partenrederij” as a way to share the risk in investment, international advertising (well-known Dutch ships), low wages. All the factors came together, constructed the core identity of Zaanstreek as a industrial city.

Lesson to learn - In the modern context, the power of techniques determines land use. It allows humans to change the land easily for their will. However, the convenience of modernity has made us weaken the connection in nature system. We can learn from the history of Zaanstreek that the landscape is regarded as a multi-functional entity that holds many possibilities to be changed. People in Zaanstreek read their landscapes comprehensively and modified their land with good knowledge. Although society was never in the best condition due to wars, storms and conflicts, the landscape brought people together through the connections of waterways, the shared use of dams, sluices, and dikes, and the cooperation in landscape modifications. The water system as a determining factor for human activities. It is an inspiration for modern people to rethink and respect the existing landscape.

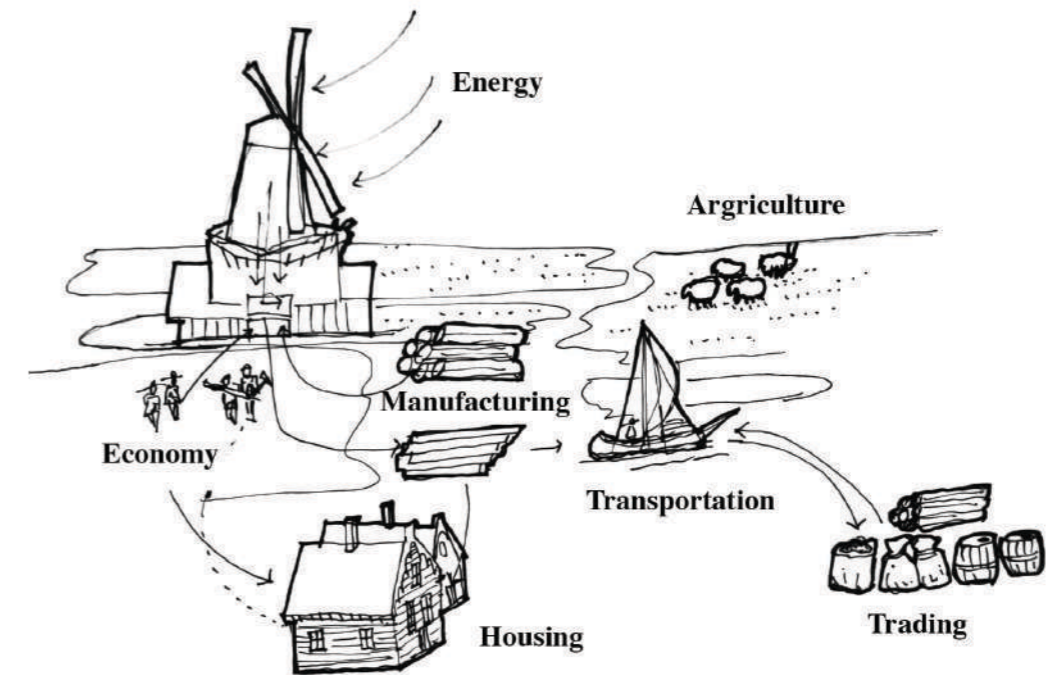
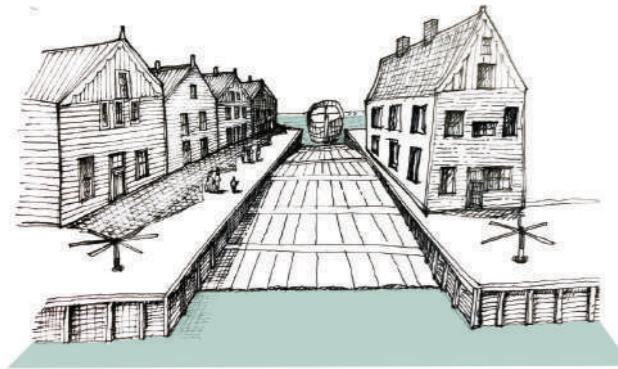


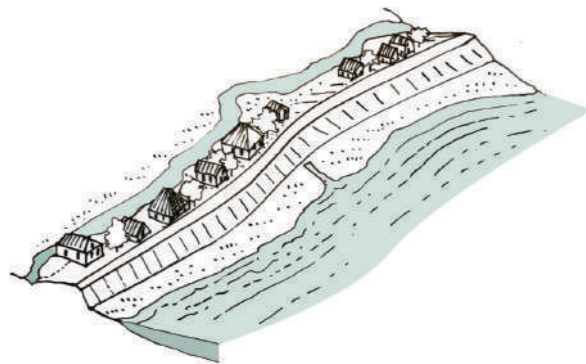
Figure 23: Circular Drawing of Zaanstreek

Glossary.



Landscape elements

Project Name: Overtoom of Westzaandam
Climate: Cfb, Temperate, fully humid, warm summer
Year: From 1609 to 1718
Water type: Brackish - Salt
Landscape Type: Polder-Boezem Landscape
Altitude: 0-3 m a.s.l.
Soil condition: Caly and Sand
Materials: Wood and Clay
Period: Fixed
Form: Spot
Use or Functions: Dragging ships cross over the dam

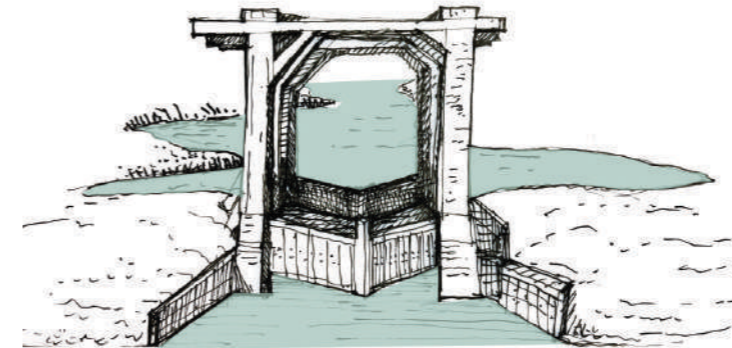


Project Name: Dike of Zaandam
Climate: Cfb, Temperate, fully humid, warm summer
Year: From 14th Century
Water type: Brackish - Salt
Landscape Type: Polder-Boezem Landscape
Altitude: 0-3 m a.s.l.
Soil condition: Caly and Sand
Materials: Clay and Sand
Period: Fixed
Form: Spot
Use or Functions: Protecting hinterland from floodings

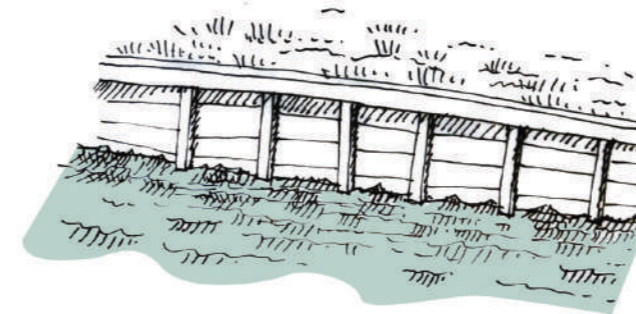


Waterworks

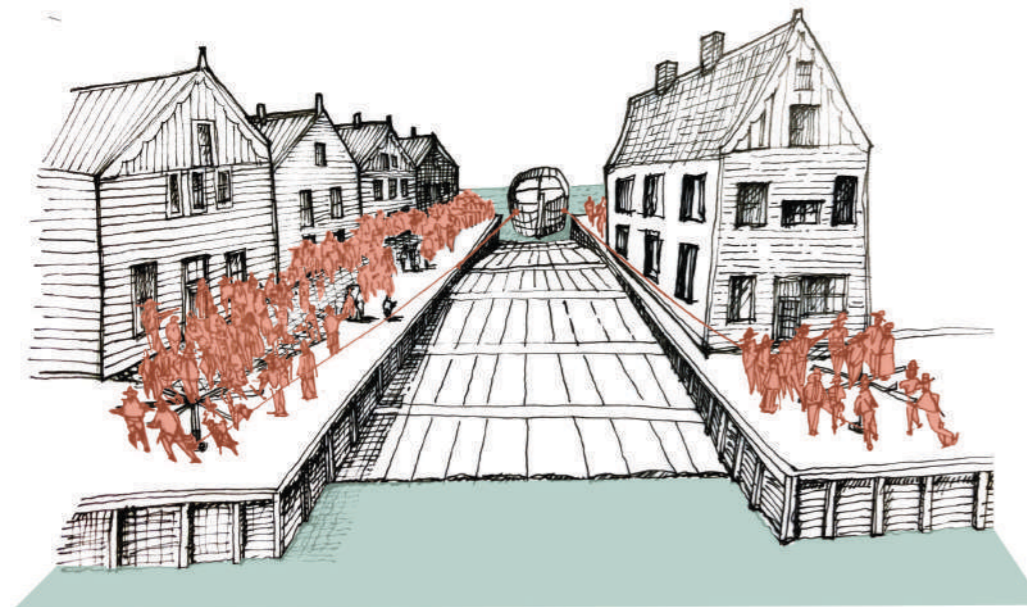
Project Name: Hogedam, or Zaandam
Climate: Cfb, Temperate, fully humid, warm summer
Year: After 14th Century
Water type: Brackish
Landscape Type: Dam city
Altitude: 3 m a.s.l.
Soil condition: Peat and Sand
Materials: Sand and Clay
Period: Fixed
Form: Line
Use or Functions: Separating two water levels



Project Name: Sluices
Climate: Cfb, Temperate, fully humid, warm summer
Year: After 16th Century
Water type: Brackish
Landscape Type: Polder-Boezem Landscape
Altitude: -1.5 m a.s.l.
Soil condition: Peat, Caly and Sand
Materials: Wood
Period: Fixed
Form: Spot
Use or Functions: Let ships pass through.



Project Name: Wood Edges (Beschoeiing/Damwand)
Climate: Cfb, Temperate, fully humid, warm summer
Year:
Water type: Brackish
Landscape Type: Polder-Boezem Landscape
Altitude: -1.5 m a.s.l.
Soil condition: Peat, Caly and Sand
Materials: Wood
Period: Fixed
Form: Spot
Use or Functions: Let ships pass through.



Water story

The Overtoom in Zaandam once well-known. Due to the dam was separating the Zaan into two different water level, the Overtoom was built to let the ship pass. Dragging by human power, the wood deck of Overtoom would be oiled, and the ship came and been brought to Voorzaan. According to research, about 38 meters long ship could be transport from hinterland toward outer water. Thus, every time when the ship was being dragged, it became a spectacle for local people and travelers.

Project Name: Overtoom of Westzaandam
Climate: Cfb, Temperate, fully humid, warm summer
Year: From 1609 to 1718
Water type: Brackish - Salt
Landscape Type: Polder-Boezem Landscape
Altitude: 0-3 m a.s.l.
Soil condition: Caly and Sand
Materials: Wood and Clay
Period: Fixed
Form: Spot
Use or Functions: Dragging ships cross over the dam

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- Figure 1:** de Leth, A. (1740). Het Scheep- en koop-ryk Zardam aen de Oost- en West-zyde van den Stroom de Zaen in Noort. Archief Zaanstad. https://archieff.zaanstad.nl/mediabank/zoek-in-de-beeldbank/detail/e3b35ec5-cb13-4135-9054-14f429f95862/media/85285816-b1d2-4acf-b485-b1a6dcd3617d?mode=detail&view=gallery&q=0005&rows=1&page=6&sort=order_i_restricted%20asc

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