The polder mill

Activity booklet by the mill ‘De Vlieger’ foundation in Voorburg

Activities for Key Stage 2 students

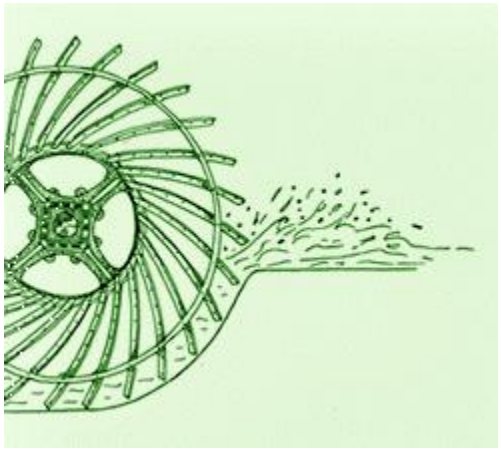
The polder mill

History

A large proportion of the west part of The Netherlands lies beneath sea level. The dykes and dunes protect the land from the risk of flooding. Electric pumping stations were built to drain the excess rainwater. Without these dykes a large proportion of the country would be under water (mainly the western area of the country and the reclaimed land in the IJsselmeer).

Map of The Netherlands. The dark areas on the map are below sea level and would be under water if there were no dunes and dykes.

In earlier times there were no mechanical pumps, so polder mills ensured that the land was kept dry. In a polder mill there is a big scoop wheel that is put in motion by the blades of the mill. The scoop wheel carries the water away. Mill 'De Vlieger' pumps the water into the Broeksloot, a small channel that leads into the Vliet and finally the North Sea.

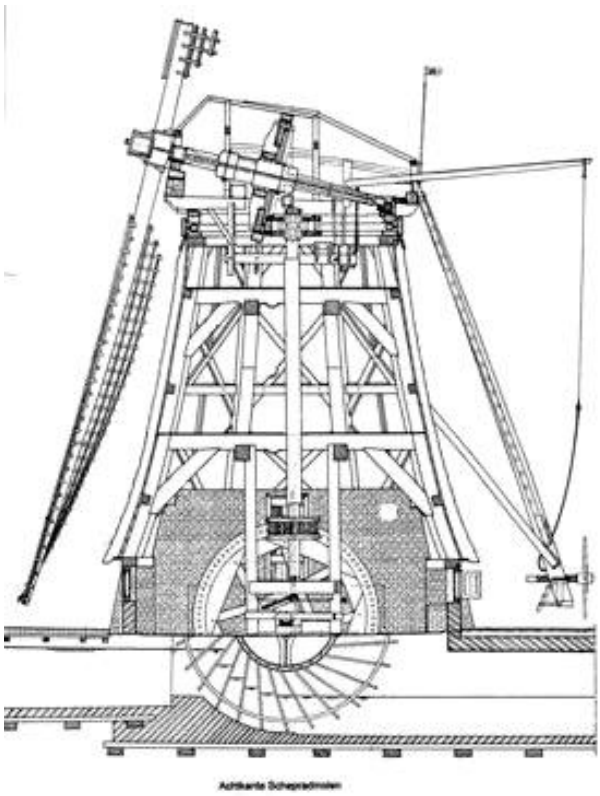


This is a drawing of a scoop wheel that scoops the water up from the lower polder. After that the water flows through channels to the sea.

Mill 'De Vlieger' is a polder mill, approximately 400 years old. The mill is constructed from wood and covered with thatch. The mill is located in the Veen and Binckhorst Polder, which is the area South East of the Hague. There were two other polder mills. The three mills kept a large proportion of Voorburg and The Hague dry for centuries. It is hard to imagine that the whole area used to be pastures and farms.

Task 1: What is the function of a polder mill?

……
……
……



This is a cross section of a polder mill. You can see that the blades are fixed in the cap, which is the upper part of the mill. The scoop wheel is driven by the blades through a long wooden shaft.

What is a polder?

A polder is a lower lying area of land surrounded by dykes. The dykes prevent the polder from flooding. However, after a rainstorm the water gets trapped in the polder and so the excess rainwater has to be pumped out. The level of the water can be adjusted inside the polder through a series of channels. Water travels through these channels when the polder is being drained. Each year the channels are cleaned out so that the water can continue to flow through. The polder mill is built near the largest and broadest channel which ensures that the water can be drained away.

Task 2: What is a polder?

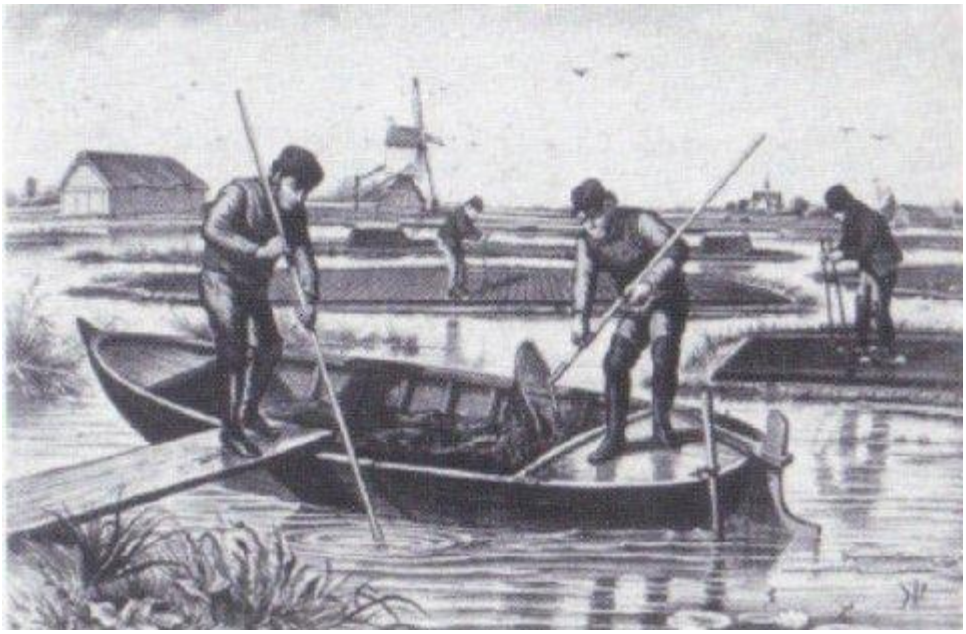
……
……
……

Peat-soil and peat

The soil in the polders consists of one part clay and one part peat. Peat is made from of plant debris and lies below the water level (below the waterline), so it is very wet and looks like muddy waste. When peat is dried it makes good fuel. It was cut into small pieces and called 'Turf'. The peat winners used so-called dredging poles to manually dredge the peat from the peat-moor waterways. They usually did this from a small boat and threw the wet peat onto the land. At that time there was no coal, little gas and firewood so people only had peat to fire up the stove.

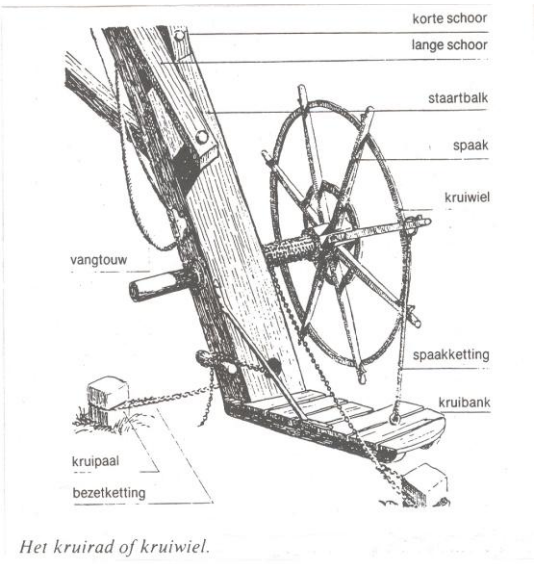
Task 3: Why was peat the dominant fuel in the Netherlands?

……
……
……



In this picture you see two turf winners in their boats. They dredge the wet peat from the water and throw on the land later to let it dry. The man on the right makes small pieces of peat. When dried, the peat is used as fuel in the stove.

2. The wind makes the blades turn



Het kruirad of kruiwiel.

Short brace
Long brace
Tail pole
Spoke
Turn Wheel
Spoke chain
Anchor platform
Brake rope
Anchor post
Anchor chain

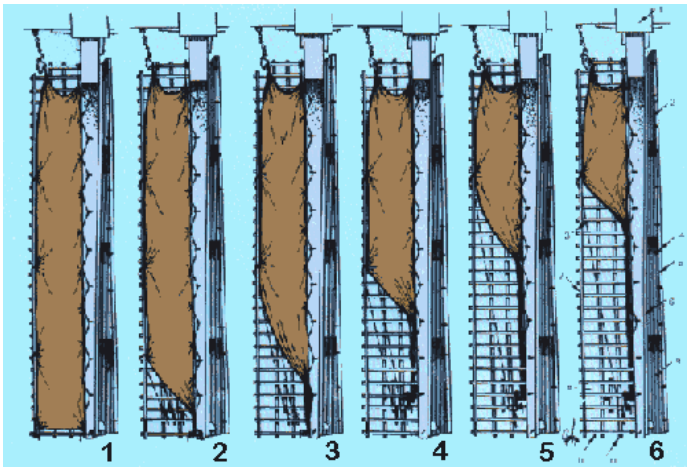
In the picture you see a 'Kruirad'. The diameter is more than two metres. The miller can turn the blades into the wind by turning the 'Kruirad'. This rotates the cap with the blades.

The blades of a mill turn by wind power but the miller has to ensure that the blades face the wind. Do you know how he does this? The blades are attached to the drive shaft in the cap of the mill. The miller can turn the cap into the wind; this is called 'kruien'. The miller turns a big wheel, the turn wheel.

Task 4: What does the miller have to do if the wind changes direction?

……
……
……

When there is insufficient wind the miller can spread sailcloth over the blades (a lattice framework) as would be done on a sailing ship. This makes the blades catch more wind and rotate faster. The miller has to climb into the blades to fasten the sailcloth with ropes. There are different ways to fasten the sailcloth. The miller can adjust the amount of cloth spread over the blades according to the amount of wind available and power needed.



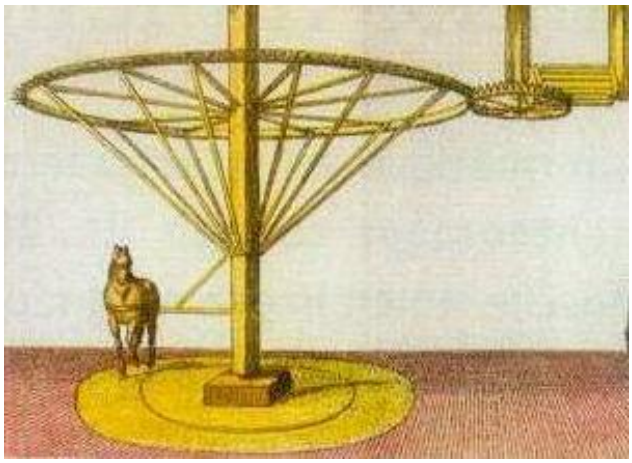
The miller can adjust the amount of cloth spread over the blades according to the amount of wind available and power needed. Light wind: more sailcloth (pict. 1). Strong wind: less sailcloth (pict. 6).

Free wind

A windmill is a great invention because wind is a free form of energy. There are no exhaust fumes so it is non-polluting. You could say that wind delivers clean energy. However, without wind the mill can't operate, so that is the main disadvantage of a windmill. No wind ..... no milling!

Task 5: What are the advantages and disadvantages of a windmill?
……
……
……

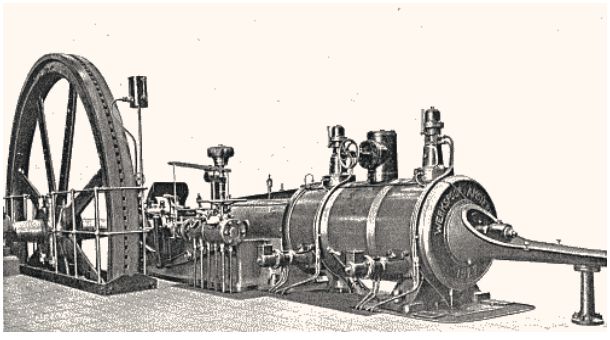
To be able to grind on occasions when there was no wind, horse mills were built. These were mostly used for grinding grain, as replacement for a traditional grain mill. A horse would walk round and round, turning a big wheel. This turns the millstone into motion. In this way people had a mill that would operate without wind. These mills were called 'Rosmolen' as 'ros' is another name for a horse.



Task 6: Why were mills driven by horses built?
……
……
……

Steam machines

In the 19th century the steam engine was invented. The machines took over work from the windmills. People were no longer dependent on wind. The polder mills were redundant and eventually replaced by steam engines. A lot of mills, both wind and horse driven, were demolished. Fortunately some mills were still operating which kept them preserved.



Task 7: Why did so many windmills disappear?
……
……
……

3. The life of a miller

The miller and his family lived in the mill. It could get very cold in the winter. The stove in the living room was the only heat source. There was no separate kitchen. The wife of the miller would cook dinner on the stove. They also used oil-stoves for cooking in those days. The miller and his wife slept in the living room in a cupboard bed. There would also be a cot or a crib where a baby could sleep. The bigger children slept upstairs. There was a carpeted room for them with a cupboard bed where two or three children slept. No one had an individual bedroom. There was no modern toilet but instead an old-fashioned toilet 'Poepdoos' in the mill. When the sewage system was constructed in The Netherlands, these toilets were no longer allowed as they were unhygienic.

There is a cupboard bed in the living room of mill De Vlieger.

Most polder mills were situated far from the village. You couldn't just go out to run an errand as it was quite a walk. The miller had to make sure that there was sufficient food in the house. It was cool in the basement and this was where the wife of the miller would keep the food including their supply of cheese and bacon. Near the mill was an allotment where the miller grew potatoes and other vegetables. Often there would be an outbuilding next to the mill housing an oven for baking bread. An oven like that was not permitted in the mill because of the risk of fire.

Task 8: Compare the miller's way of living in the past with the present.

Past	Present
Cupboard bed	.....
Baby in a manger	.....
Poepdoos	.....
Oil stove	.....
Cool basement	.....
Allotment with vegetables	.....

Attention at the mill !

It is dangerous to go near the mill when the blades of the mill are turning as the blades come close to the ground. The door on the side, where the blades turn, is locked and the other door is used for access which is why mills always have two doors. It is also dangerous to be in the mill during thunderstorms. Many mills caught fire after being struck by lightning. Nowadays all mills have a lightning rod.

Task 9: Name some hazards at the mill.

……
……
……

The work of the miller

The miller was often taught by his father. In this way he would learn the trade in practice. The miller always had to observe the weather closely. He had to stop the mill in case of stormy weather. If it had rained a lot the miller would have to run the mill for a long time to drain the water. This water had to leave the polder or the land would flood. If needed and there was enough wind, the mill had to run overnight. The miller wasn't allowed to sleep when the mill was working.

If it hadn't rained for a while during the summer the mill wouldn't have to drain. The miller would earn some extra money by helping the farmers with their mowing and harvesting. The polder channels were full of fish and eels which he could eat. Spare fish would be sold to the fishmonger.

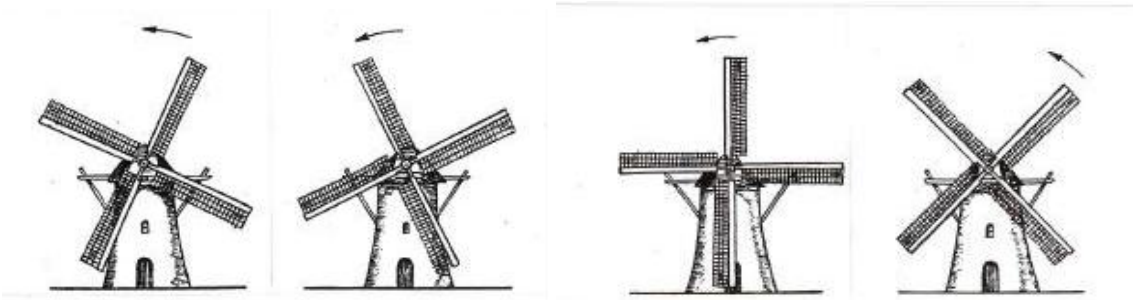
Task 10: What chores do you do to make extra money? What do you have to do?

……
……
……

The language of the mill blades

Most polder mills were situated in the polder far away from civilization. Often it would take up to one hour to reach your neighbours by foot. There were no telephones in those days. One form of communication with the outside world was by using the blades of the mill. By positioning the blades in a certain way the miller could pass on a message to another mill.

The miller would use this way of communicating for someone's birthday or when a child was born or if there was a wedding. The blades would be out in the 'joy position'; therefore people in the village could see what was going on. Some millers would decorate the blades with bunting. If someone died the blades were put in the 'mourning position'. If the miller had finished work for the day the blades would be put in the 'upright position' If the mill didn't have to grind for a longer period the blades would be put into the 'rest position'.



1. Joy position *2. Mourning position* *3. Upright position* *4. Rest position*

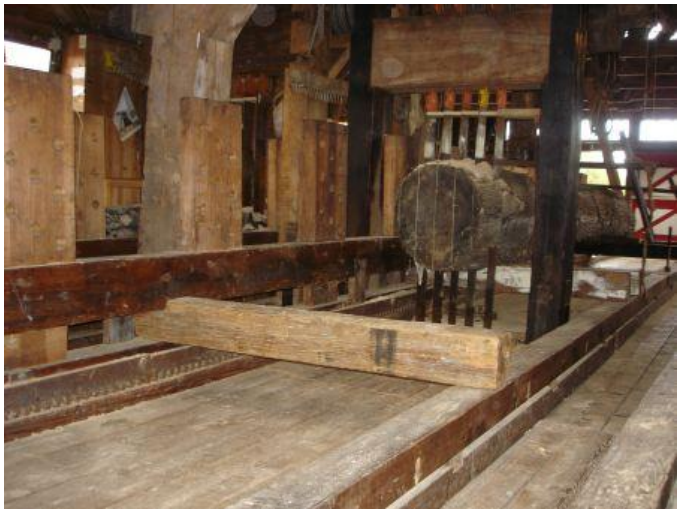
Task 11: Above you can see different ways of positioning the blades. Can you think of an occasion for which the blades should be put in the joy position?

……
……
……

4. Industry mills

There have been windmills in The Netherlands for over 800 years. The grain mill is the oldest type and every city and village had one. Between the big grinding stones the grain was ground. The flour then went to the bakers for baking bread. Much later other mills were built. From 1600 the windmills were used as industry mills. Machines had not been invented yet and energy had to come from the wind and the rotating windmill. At one point there were some 10,000 windmills in The Netherlands.

There are many industry mills that took over manual labour from man. There were oil mills where oil was pressed from seeds. The paint and white mills ground the raw materials for the potteries and paper was made in the paper mills. There were many industry mills which is basically a small factory.



In this picture you can see the interior of a saw mill. In a saw mill trees were sawn into large beams.

The invention of the saw mill had great impact on the prosperity of the country.
In a saw mill trees were sawn into large beams and boards. Because of this, many ships such as commercials vessels and warships could be built in a short space of time.

Task 12: Name some industry mills and the products they produced?

……
……
……

The preservation of the mills

Voorburg has expanded a great deal since the war. Many houses were built near to the mill 'De Vlieger' which used to be located near the Forum Kwadraat at the end of the Badhuislaan. Because of all the buildings surrounding the mill the blades didn't get enough wind to turn. Windmill De Vlieger was a bit in the away, but the council was keen to preserve the mill.

This is a picture of mill 'De Vlieger' at its old place near the Badhuislaan. You can see that flats have already been built near to the mill. Because of this the mill didn't get sufficient wind to turn properly.

In 1989 the mill was moved and rebuilt a kilometer away in the district of Essensteijn.
At its current location along the Essepad, Mill 'De Vlieger' houses a museum. The interior of the mill remains just as it would have been. If you visit the mill, the miller or one of the volunteers will give you a tour that explains how everything works.

We often say that The Netherlands is the country of clogs, cheese and mills. A mill is part of the cultural heritage. Because mill 'De Vlieger' has been preserved we can still see how a polder mill works and how a miller's family previously lived and worked the mill.

Task 13: Do you think we should keep the mills, and why?

……
……
……
……
……
……

Mill Glossary

Allotment: A vegetable garden.

Blades: A mill has 4 blades that turn by the wind.

Cap of the mill: The upper part of the mill that can be turned into the wind. The blades are attached to a large axis in the cap of the mill.

Cultural heritage: monuments, objects, landscapes, stories and other traces of the past.

Cupboard bed: A bed that is built into a wall with curtains or doors fitted in front of the bed.

Farmland: Lowland pasture where cows and horses graze.

Horse mill: A mill that uses a horse as power source.

Industry mills: These mills are used to saw wood, grind paint, press oil and make paper.

Kruien: Turning of the big 'Kruirad' by the miller.

Mortar: Looks like a big screw that raises the water. Mortars were once made of wood but made of steel from 1900.

Oil mill: A mill where oil is squeezed out oilseeds such as linseed, rapeseed, rape, hemp seed, but also from peanuts. The oil was used for baking, for oil lamps and oil paint.

Peat: Upon drying peat can be used as fuel.

Peat-soil: Wet, marshland soil composed of decayed vegetation matter.

Polder: A lower lying area of land surrounded by dykes. The water level is adjusted by polder mills.

Polder mill: A wind mill that drains the water from the polders using a scoop wheel.

Saw mill: A saw mill cuts the wood into beams and boards using wind power.

Scoop wheel: A big wheel with scoops which is used to for draining land. It is also called a water wheel.

Steam machine: A type of engine driven by steam.

Stove: The only heat source in the mill that is also been used for cooking.

Turn wheel: The big wheel that rotates the cap into the wind.

Urbanization: Gradual expansion of a city due to population growth. This sometimes comes at the expense of agriculture or nature.

Windmill language: By positioning the blades in a certain way the miller could pass on a message to another mill

Wind mill: The blades of a windmill are put in motion by the wind. The movement of the blades is used grinding grain, pumping water, or to cut wood.

Colophon

The activity booklet "The polder mill" is designed by the mill 'De Vlieger' foundation in Voorburg. The booklet is designed especially for primary school children in year 5.

The activity booklet is designed in partnership with the Heritage Council of South-Holland and includes a section for teaching staff and a section with activities for the students.

Text:
Aart Struijk

English translation 2011:
Bas Verwijmeren, Junior School Leidschenveen, The British School in The Netherlands.

Advice:
Maaike Ros, The Heritage Council of South-Holland, department Heritage education.
Liesbeth Redelijkheid, Primary school "De Vijverhof" in Voorburg.
Marleen Ettema, Council of Leidschendam-Voorburg.

Courtesy of The Heritage Council of South-Holland, September 2011.

Windmill 'De Vlieger' foundation
Administration Post-Office box 84
2270 AB Voorburg
Website: www.molendevlieger.nl

Miller: A. Zonderop, phone 070 3694372
Email: azonderop@casema.nl

Visiting address:
Windmill 'De Vlieger'
Essepad 3
2272 JS Voorburg