# Friesland: Landtypes & Dikes

## using Web Services in ArcGIS 10

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## Introduction

A dike is an imbankment built to prevent floods. The Netherlands is a country protected by dikes, without dikes we would be very vulnerable for flooding.

In this presentation the focus will be on the dikes in Friesland and especially the seadikes.

Building dikes costs a lot of effort and money. Why are the dikes not built only on the coastline and around rivers? And what is the relationship between different land types and the placement of the dikes.

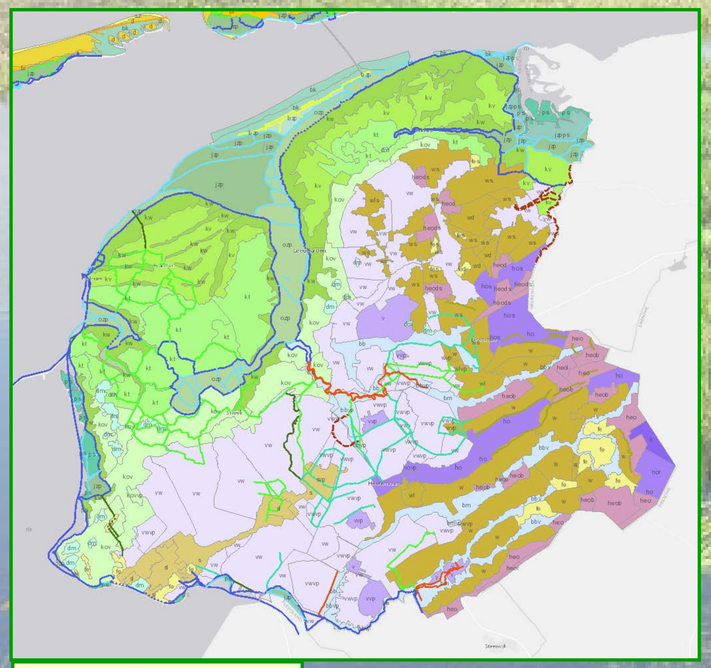
So the issue we will investigate is whether building dikes can be a less extensive and consequently less costly process than it is now.

## Aim

The aim of this project is to use different WMS- or WFS-layers, and to combine them in ArcMap. With this created map, a relation between these layers can be interpreted. In this case, the types of soil in the Dutch province Friesland are being compared to the positioning of dikes in Friesland.

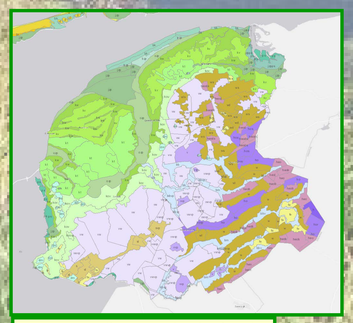
## Methods – finding a WMS

We have decided to combine two WMS-layers, and interpret their relation in one map. The layers come from one WMS-server, since the Dutch province Friesland has put all their information-layers in one WMS url.
The layers that are going to be used are from:
http://geoportaal.fryslan.nl/arcgis/services/ProvinciaalGeoRegister/PGR/MapServer/WMSServer
Here, the layer 'Dijken' and the layer 'Landschapstypen' are being used

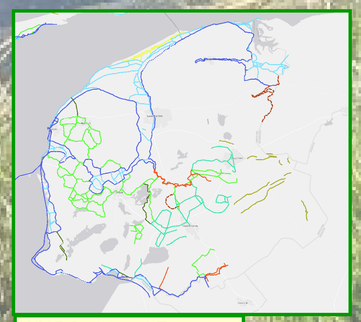


The combined layers in one map





WMS 1: soiltypes of Friesland



WMS 2: dikes of Friesland

## Relation between the two web services

The first WMS-layer shows the different types of soil of the Dutch province Friesland. The second WMS-layer shows the different types of dikes that are built in Friesland. They both represent data about Friesland, and the formation of the soil in the northern part is due to the dikes that have been built there.

## Conclusion

As seen in the northern part of Friesland, there are sea-dikes built around the older and younger polder-soils. This is not a coincidence. In matter of fact, the northern part of Friesland was once flooded (around the 10th century AD). The *middelzee* had made a cut into Friesland, which seperated the north-east from the north-west. To prevent the rest of Friesland to be flooded, seadikes have been built. Between 1200 and 1300 AD, the *'oude Biltdijk'* has been built which has caused the *middelzee* to dry out.

In the map you can see that the soil surrounding the polder-soil is salting (or in Dutch: *'kwelder'*). If the salting dries out, the soil turns into a polder-soil.

Now, that land – which was once a sea - consists of polder-soil.

So the dikes in the inland are not built to protect the Netherland against the sea now but in the 10th century.


## Literature

Legend:
http://bestemmingsplan.planviewer.nl/files/plannen/NL.IMRO.1722.101611-ON01/tb_NL.IMRO.1722.101611-ON01_1.pdf (page 17)
Map of Heights - Netherlands:
http://ahn.geodan.nl/ahn/viewer3/index.html
WMS Friesland (soiltypes& dikes):
http://geoportaal.fryslan.nl/arcgis/services/ProvinciaalGeoRegister/PGR/MapServer/WMSServer?
Layer of the cities:
ArcMap / Add Data / Add Basemap / CanvasWorld_Light_Gray_Reference
Information history Friesland:
http://upload.wikimedia.org/wikipedia/commons/9/96/Middelsee.png

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