

# Pilot area description – Norsminde Fjord



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## 1. General pilot area description

The alliance finds it important to develop and test solutions in cooperation with multiple operators from different areas of the country. One important focus area is the area surrounding the Limfjord. Here the alliance will work in e.g. Skive and Jammerbugt municipalities. Moreover, operators from Varde, Horsens, and Odsherred municipalities will be involved.

So far, the alliance has established 7 pilot areas. These areas will function as test-case areas where scientists and operators can meet and discuss the implementation of different initiatives. Scientific results and experience from these areas can later be used in other localities with similar characteristics. It is therefore important that the pilot areas represent the variability of Denmark not only in relation to geographical location but also to land use, geology, etc. The delineation of the pilot areas is based on water catchment and therefore often relates to a given fjord or a watercourse system.

Operators from other parts of the country will be involved ongoing. Thereby, the different research areas will develop the most optimal way.



**Map:** Overview of the pilot areas.

## 2. Norsminde Fjord – geographical location

The pilot area Norsminde Fjord will be functioning as a research location but there will not be held workshops in the area. The area covers 10863 ha and belongs to Aarhus and Odder municipalities. The area is delineated by the watercourse catchment (e.g. Odder stream). In 1830 half of the Fjord – which at the time was twice as big – was damped up, drained, and cultivated. Later, attempts has been made to recreate the Fjord but with no success, and today these areas are large wetlands. The Norsminde Fjord area represents a variable terrain, being mainly flat towards the fjord and hillier further inland. The hilly terrain holds some forest and the more flat terrain holds wetlands and meadows. The agriculture still covers most of the area and the soil is also dominated by clayey fertile soils.

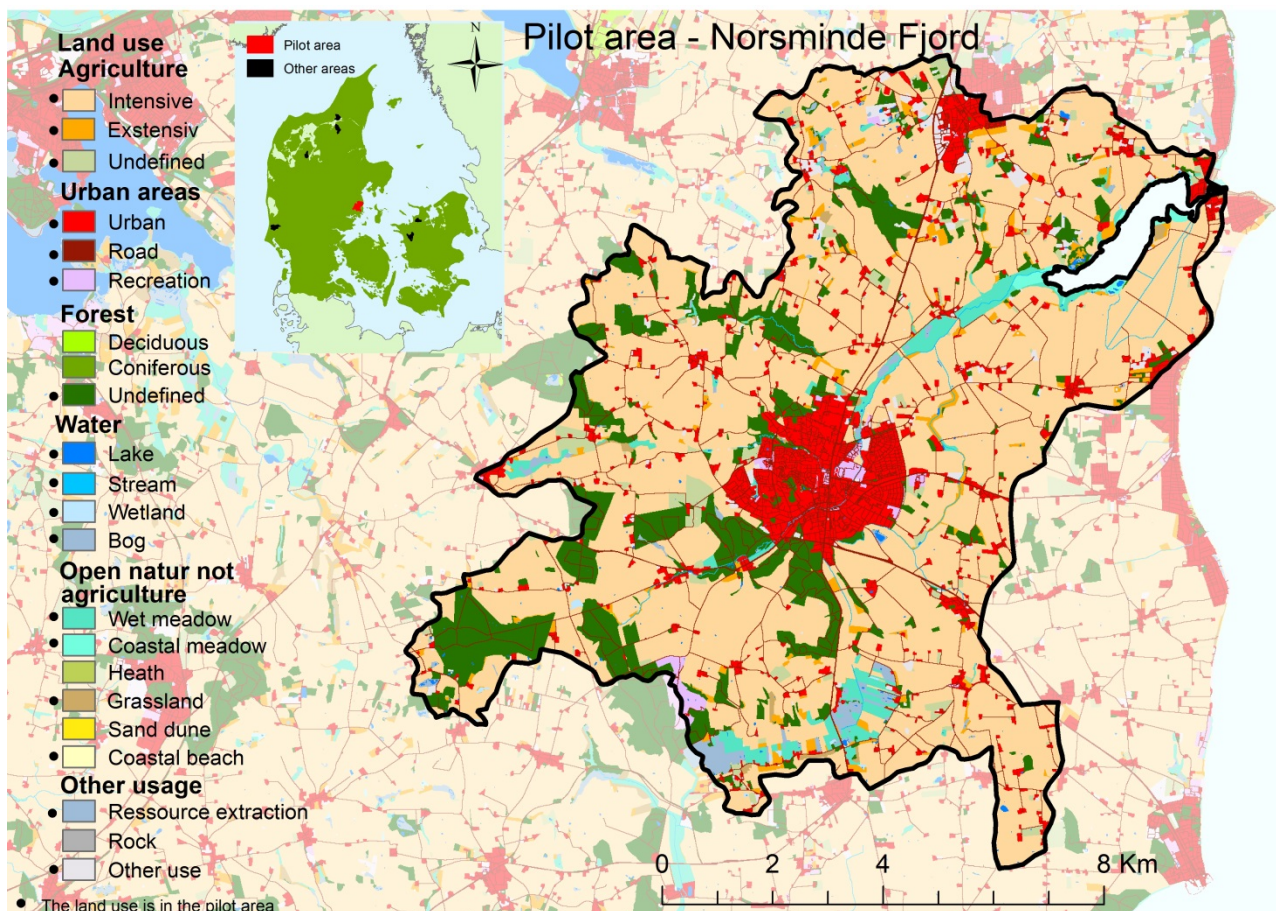


**Map:** Geographical location of the pilot area near Norsminde Fjord.

## 2.1. Land use

The main land use near Norsminde Fjord is intensive agriculture (62.7 %) followed by nature areas outside agriculture such as forest, open nature, and water (total 16.8 % without the Fjord) and urban areas (14.6 %) (map and table). Norsminde Fjord thereby represents – together with Gjoel – where the forest, water, and open nature ratio is average compared to the other pilot areas (figure).

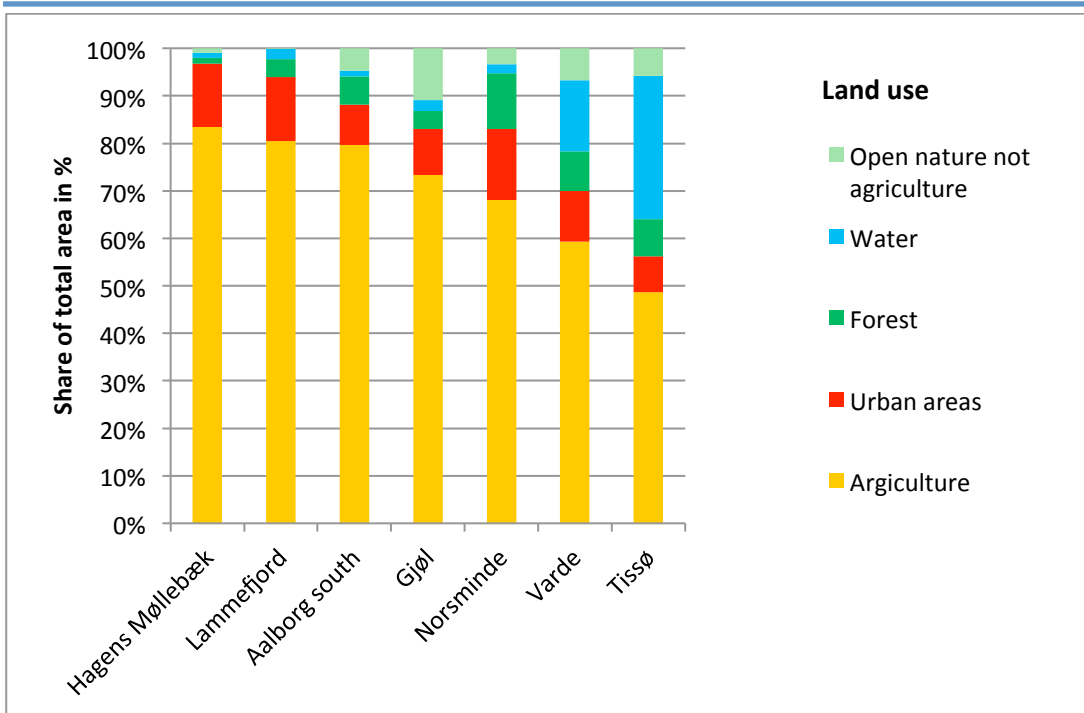
Land use is illustrated on the map and the belonging table for the Norsminde Fjord areas below. Furthermore, land use for the 7 pilot areas is illustrated in the figure.



**Map:** Land use in the pilot area Norsminde Fjord in 10×10 meters resolution.

**Table:** Land use in the Norsminde Fjord area in hectare (ha) and share of total area in percent (%).

Land use	Area (ha)	Share of total area (%)	Share of total area (%)
<b>Agriculture</b>			66.9
Intensive	6808	62.7	
Extensive	235	2.2	
Undefined	230	2.1	
<b>Urban areas</b>			14.6
Urban	857	7.9	
Road	653	6.0	
Recreation	71	0.7	
<b>Forest</b>			11.5
Deciduous	1	0	
Coniferous	0	0	
Undefined	1252	11.5	
<b>Water</b>			1.9
Lake	31	0.3	
Stream	41	0.4	
Wetland	11	0.1	
Bog	125	1.1	
<b>Open nature not agriculture</b>			3.4
Wet meadow	276	2.5	
Costal meadow	50	0.5	
Heath	1	0	
Grassland	37	0.3	
Sand dune	0	0	
Coastal beach	2	0	
<b>Other usage</b>			1.7
Resource extraction	2	0	
Rock	0	0	
Other use	180	1.7	
<b>Total</b>	10863	100	100



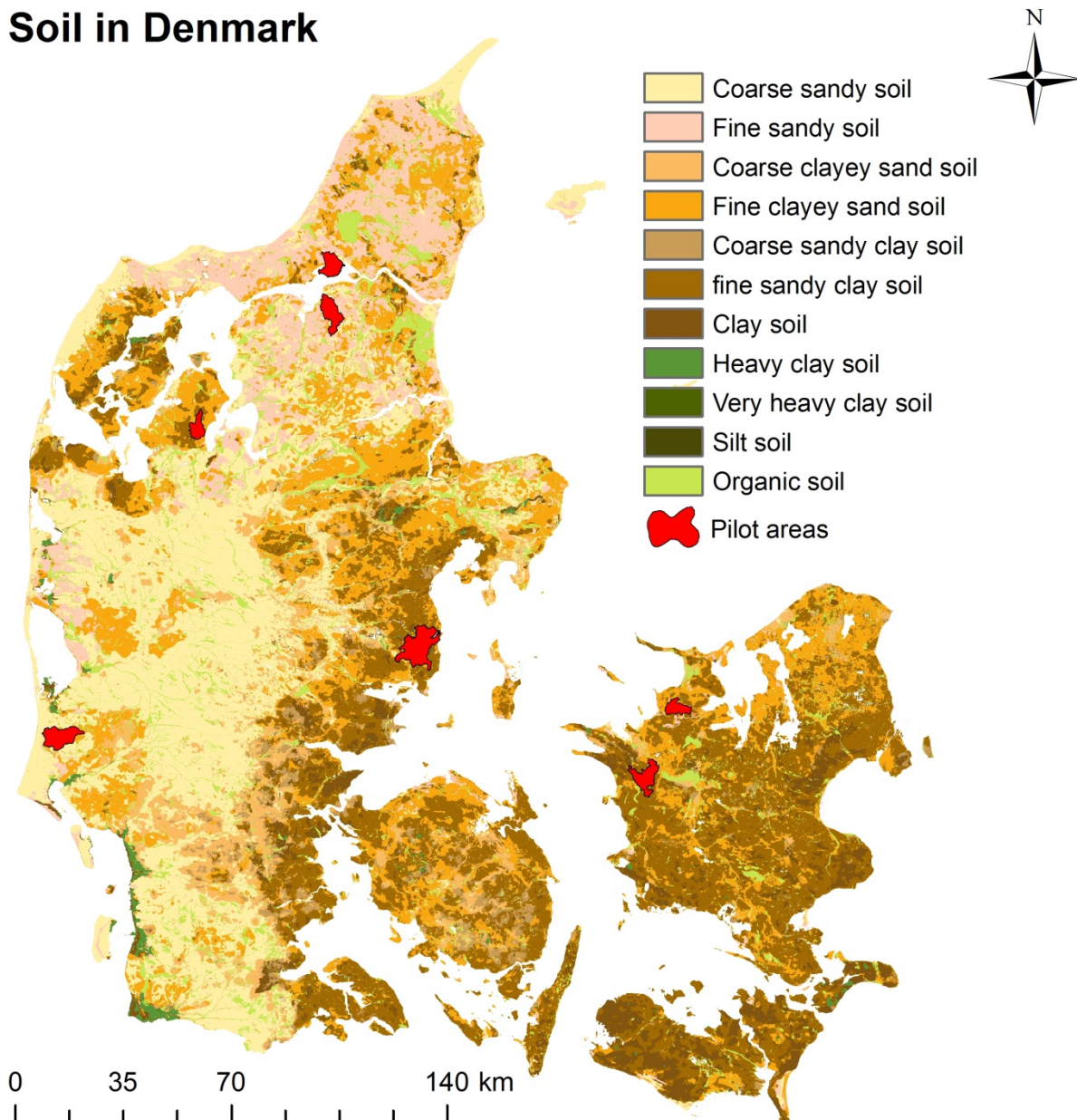
**Figure:** Land use in the 7 pilot areas described as share of total area in percent (%). The pilot areas are listed to % agriculture.

## 2.2. Soil type

Overall the western soils of Denmark contain a high sand percentage whereas the eastern parts are dominated by the more heavy soils - clay (map 1). Norsminde Fjord is located in eastern Jutland and is also dominated by the clayey soils (70 %) (map and table)

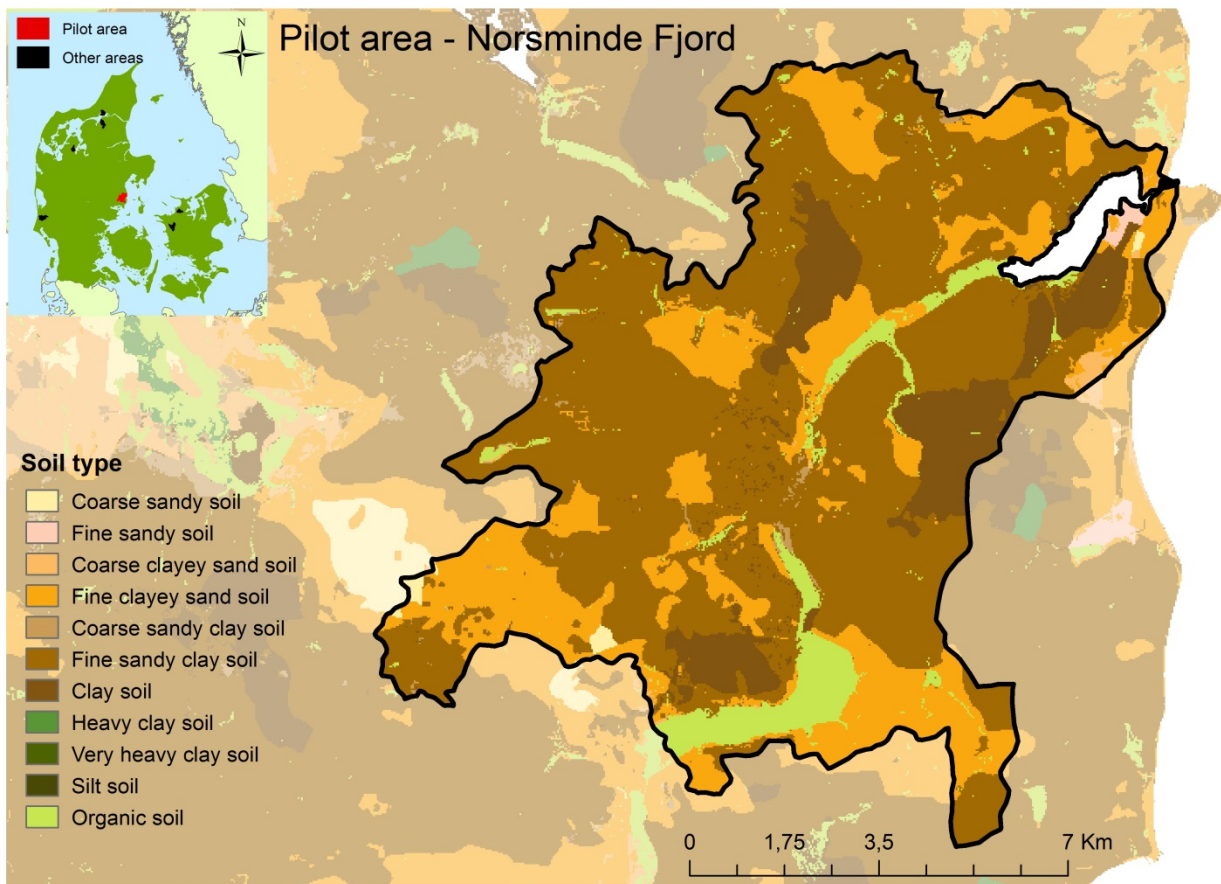
The soil types of the pilot area are illustrated on map 2 and the belonging table below.

### Soil in Denmark



**Map 1:** Soil type in Denmark.





**Map 2:** Distribution of soil types in the pilot area near Norsminde Fjord in 30.4×30.4 meters resolution.

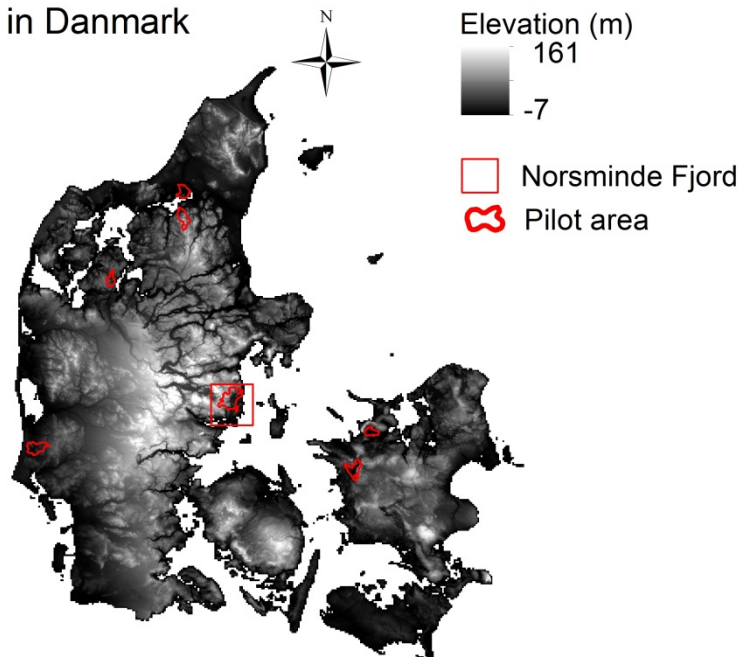
**Table:** Distribution of soil types in the pilot area near Norsminde Fjord in hectare (ha) and share of the total area in percent (%).

Soil type	Area (ha)	Share of total area (%)
Coarse sandy soil	45	0.4
Fine sandy soil	31	0.3
Coarse clayey sand soil	53	0.5
Fine clayey sand soil	2531	23.3
Coarse sandy clay soil	48	0.4
Fine sandy clay soil	6460	59.5
Clay soil	1101	10.1
Heavy clay soil	0	0
Very heavy clay soil	0	0
Silt soil	0	0
Organic soil	586	5.4
<b>Total</b>	<b>10855</b>	<b>100</b>

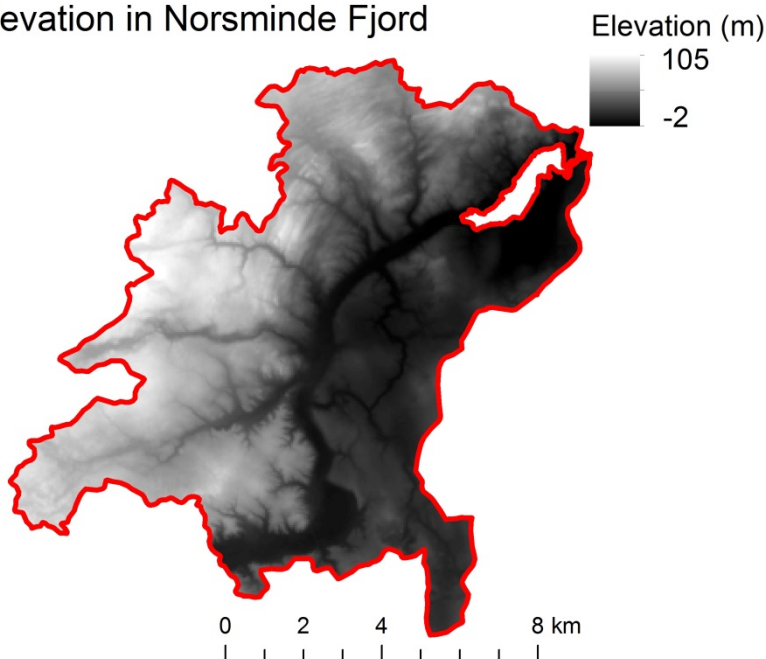
### 2.3. Terrain

With an elevation varying from -7 to 161 meters above the sea level (map 1), and a slope of the terrain from 0-51 degrees (map 2) the catchment of Norsminde Fjord represents a highly variable terrain. It can roughly be divided in to a hilly western part and a lower flat eastern part.

a) Elevation in Denmark

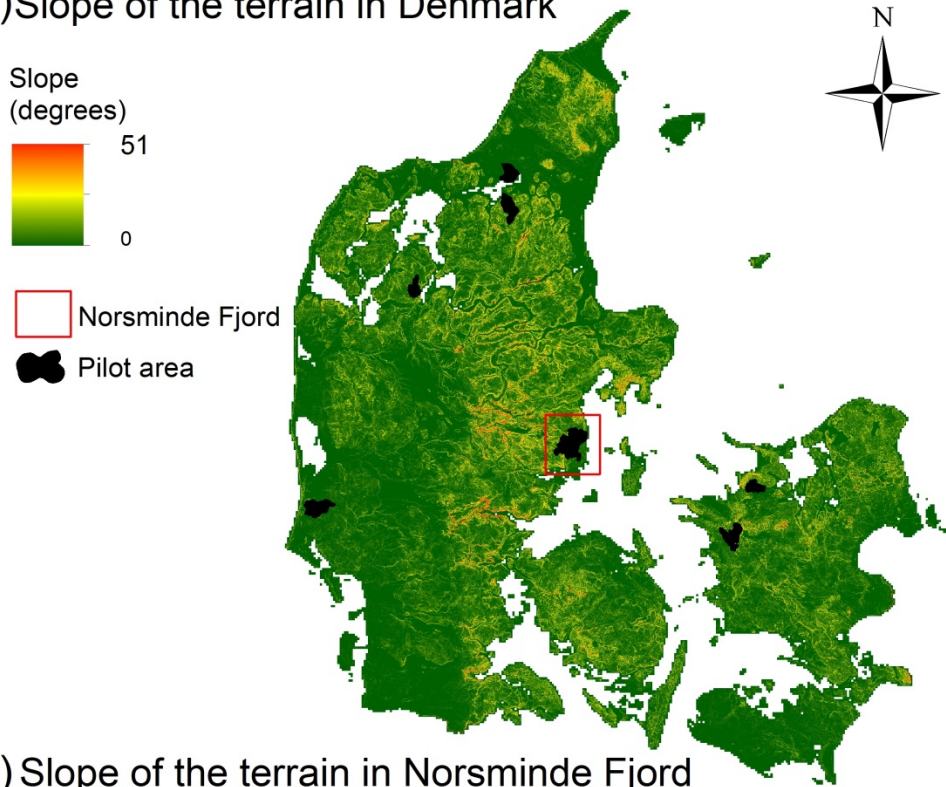


b) Elevation in Norsminde Fjord

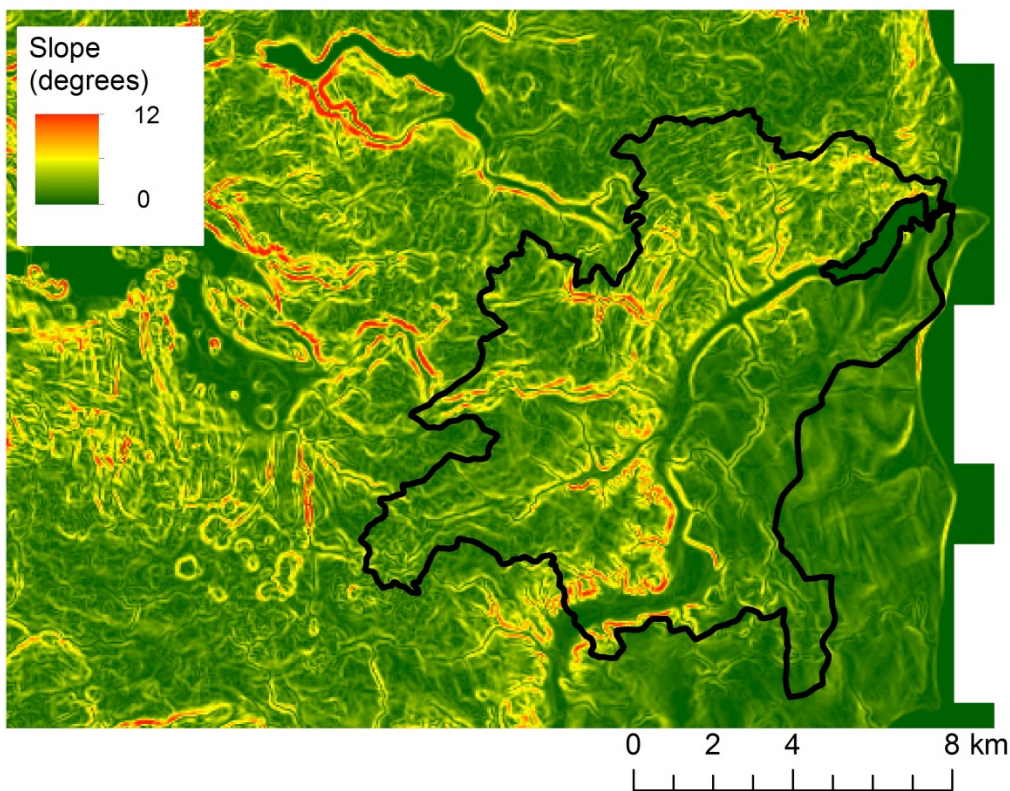


**Map 1:** Elevation in Denmark (a) and in the pilot area near Norsminde Fjord (b) in 48×48 meters resolution.

a) Slope of the terrain in Denmark



b) Slope of the terrain in Norsminde Fjord

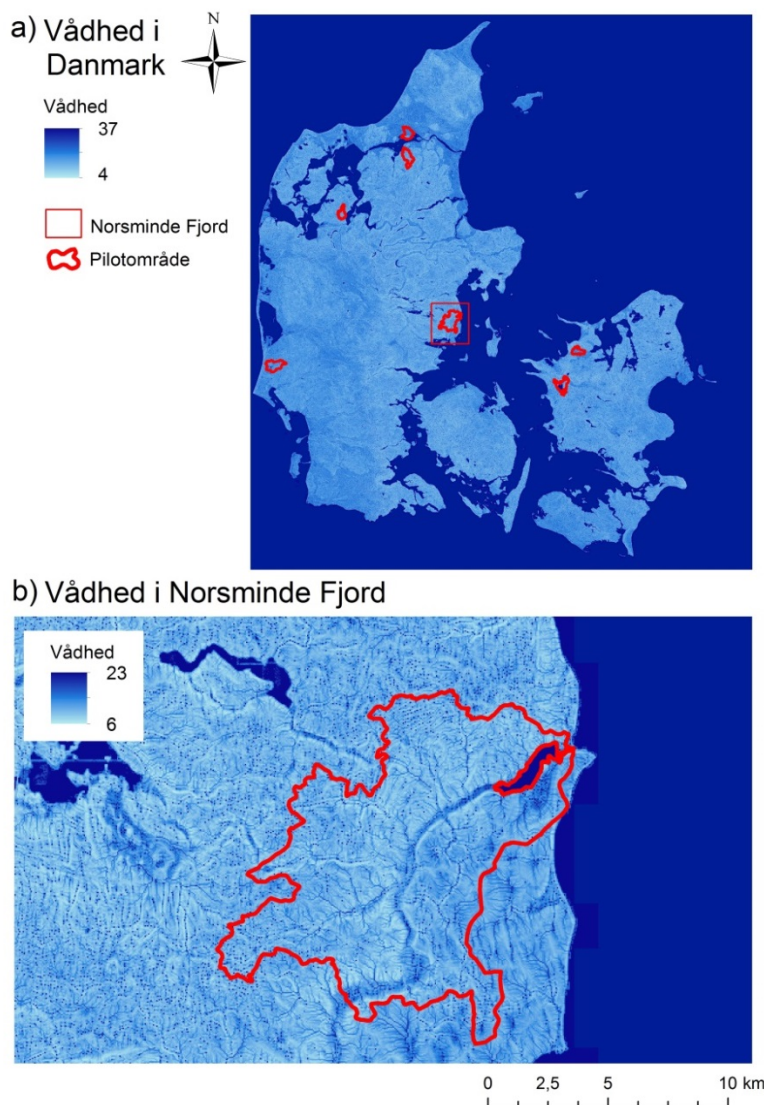


**Map 2:** Slope of the terrain in Denmark (a) and in the pilot area near Norsminde Fjord (b) in 48×48 meters resolution

## 2.4. Hydrology

Wetness is here illustrated by the topographical wetness index. The wetness index calculates how much water a given point in the terrain potential can receive (the size of the catchment) in relation to its ability to drain itself (slope of the terrain). The index expresses the ability of the point to accumulate water. It is based alone on placement of the point in the terrain and the shape of the terrain, and does not include other factors such as soil type, precipitation, etc.

The pilot area near Norsminde Fjord generally varies in wetness with the driest areas located towards the elevated western part of the area.



**Map:** Topographical wetness index in Denmark (a) and in the pilot area Norsminde Fjord (b) in 48×48 meters resolution.

### 3. References

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