

# Pilot area description – the Lammefjord



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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. The Lammefjord – geographical location

The Lammefjord was in the beginning of the 1900’Th century embanked and drained, which has resulted in a fertile area located in northwest Zealand in Odsherred municipality. The pilot area represents a low lying area covering 2897 ha. The terrain, drainage of the soil, and the relatively high clay percentage in the soil makes the area favorable for intense agriculture. This is also the dominating land use in the area, whereas nature outside agriculture covers a much smaller area.

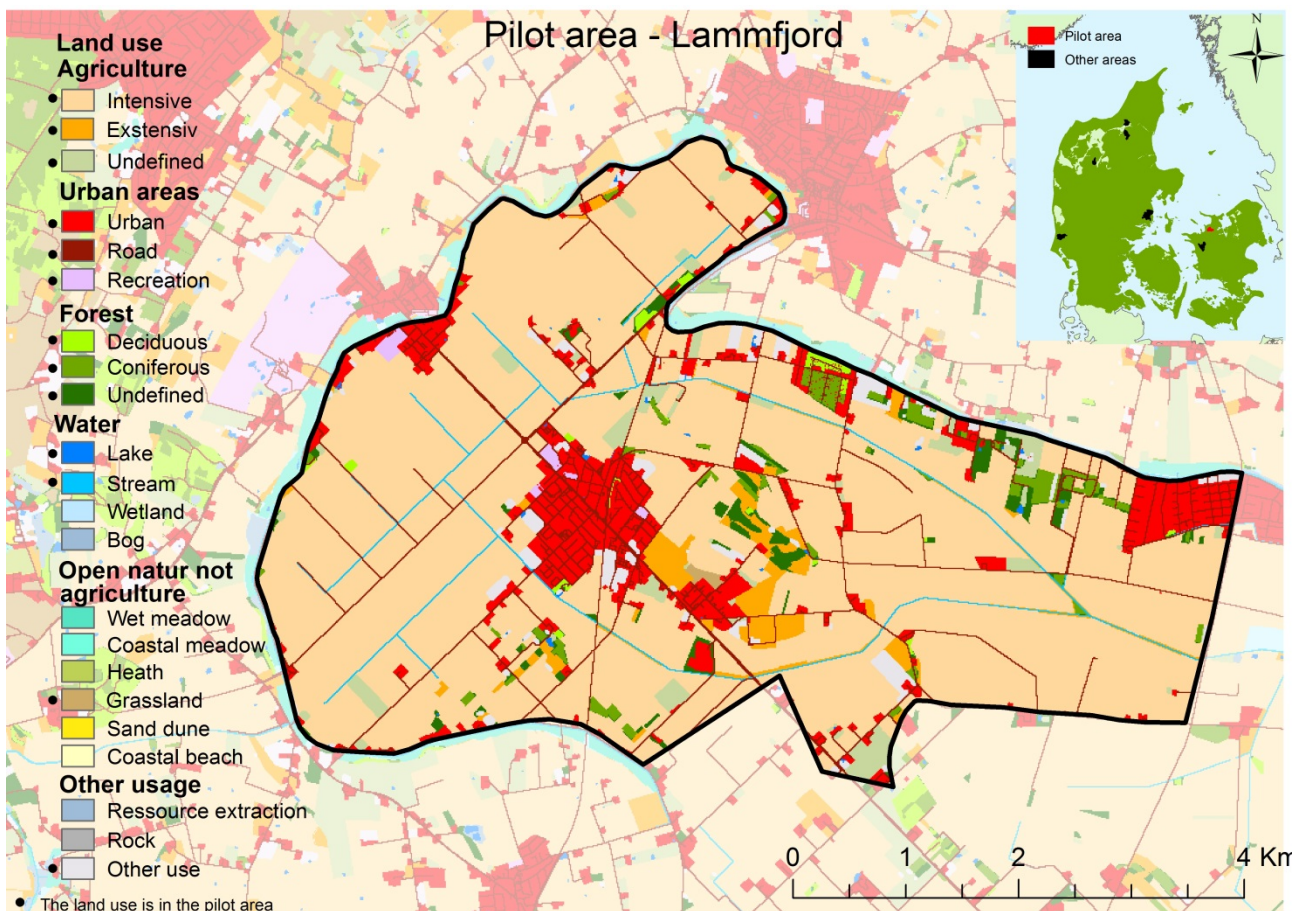


**Map:** Geographical location of the pilot area Lammefjord.

## 2.1. Land use

The main land use in the Lammefjord is intensive agriculture (74 %) followed by urban areas (13.2 %) and nature areas outside agriculture such as forest, water, and open nature (6 %) (map and table). The area thereby represents – together with Hagen Moellebaek – the pilot areas with the highest ratio of agriculture (Hagens Moellebaek = 82.8 %) and the lowest area of nature outside agriculture (Hagens Moellebaek = 3.2 %) (figure).

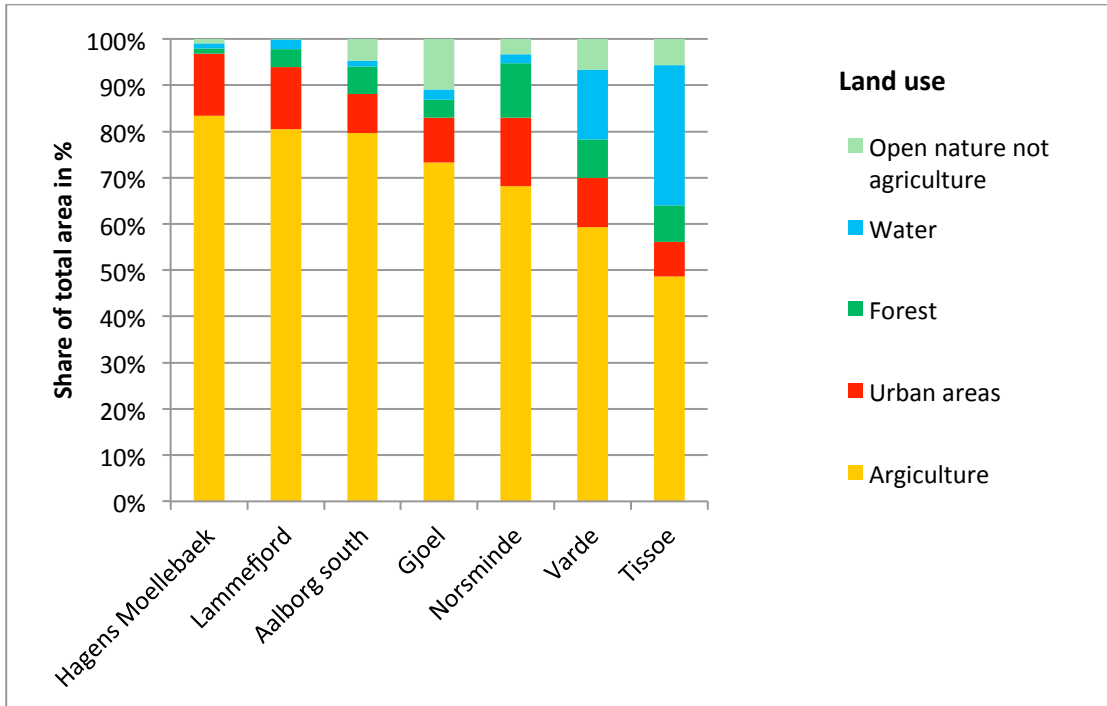
Land use is illustrated on the map and the belonging table for the Lammefjord below. Furthermore, land use for the 7 pilot areas is illustrated in the figure.



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

**Table:** Land use in the Lammefjord 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>			79.4
Intensive	2144	74.0	
Extensive	82	2.8	
Undefined	74	2.6	
<b>Urban areas</b>			13.2
Urban	230	8.0	
Road	144	5.0	
Recreation	8	0.3	
<b>Forest</b>			3.8
Deciduous	12	0.4	
Coniferous	46	1.6	
Undefined	52	1.8	
<b>Water</b>			2.1
Lake	3	0.1	
Stream	30	1.1	
Wetland	0	0.0	
Bog	0	0.0	
<b>Open nature not agriculture</b>			0.1
Wet meadow	0	0.0	
Costal meadow	0	0.0	
Heath	0	0.0	
Grassland	3	0.1	
Sand dune	0	0.0	
Coastal beach	0	0.0	
<b>Other usage</b>			2.3
Resource extraction	0	0.0	
Rock	0	0.0	
Other use	67	2.3	
<b>Total</b>	2897	100	100



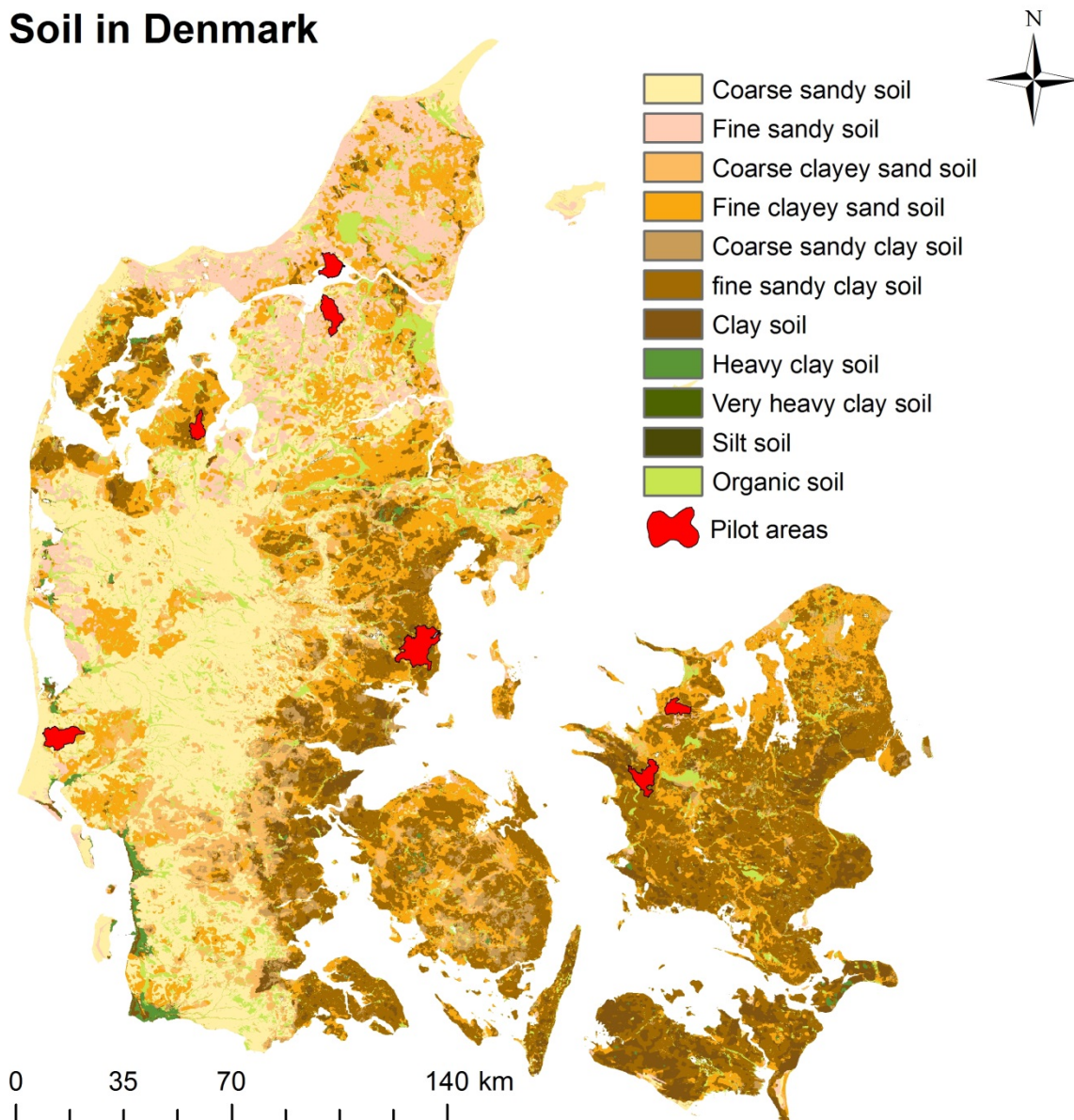
**Figure:** Land use in the 7 pilot areas described as share of total area in percent (%). The pilot areas are listed to % agriculture.

## 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). The Lammefjord is located in eastern Denmark and is also dominated by the clayey and fertile soils (58 %) (map 2 and table).

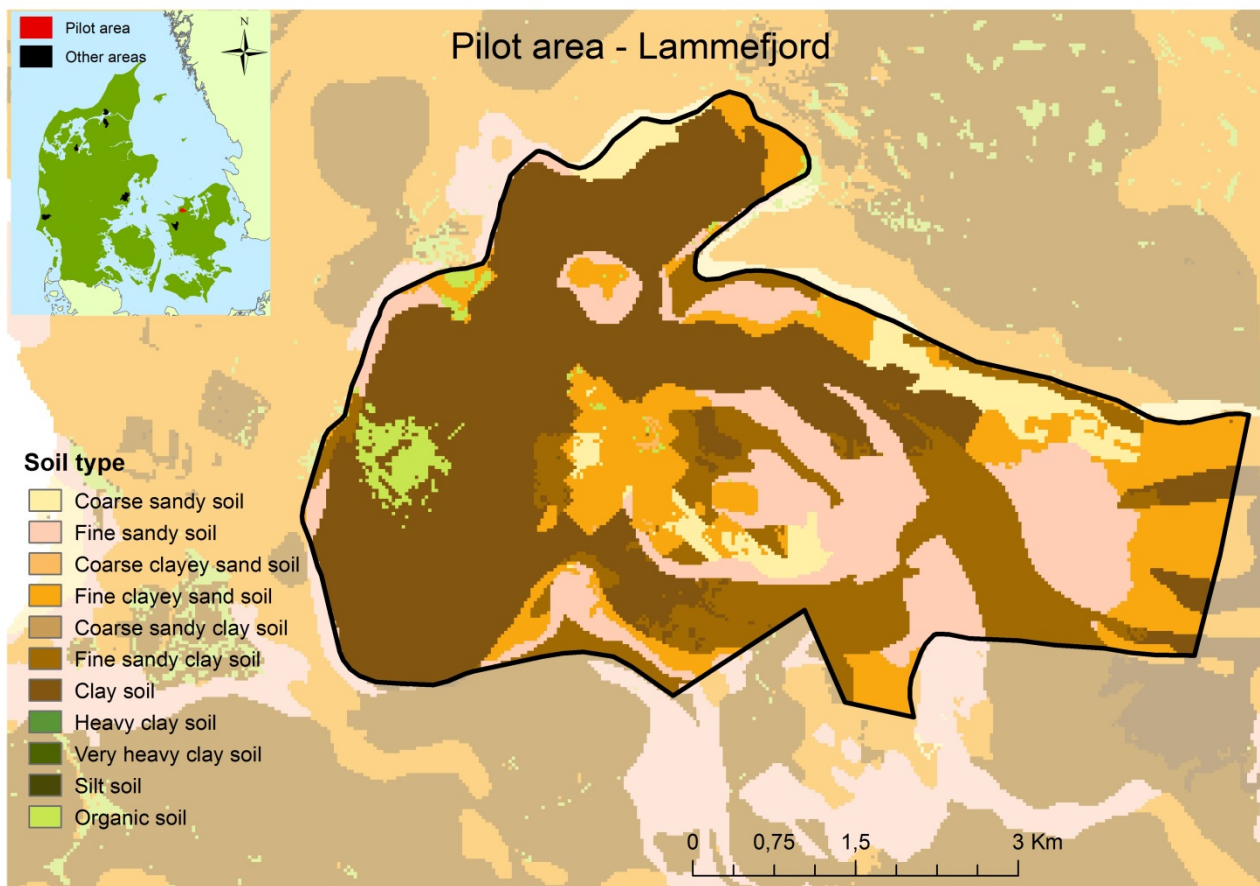
The soil types of the pilot area are illustrated on map 2 and the belonging table below.

### Soil in Denmark



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





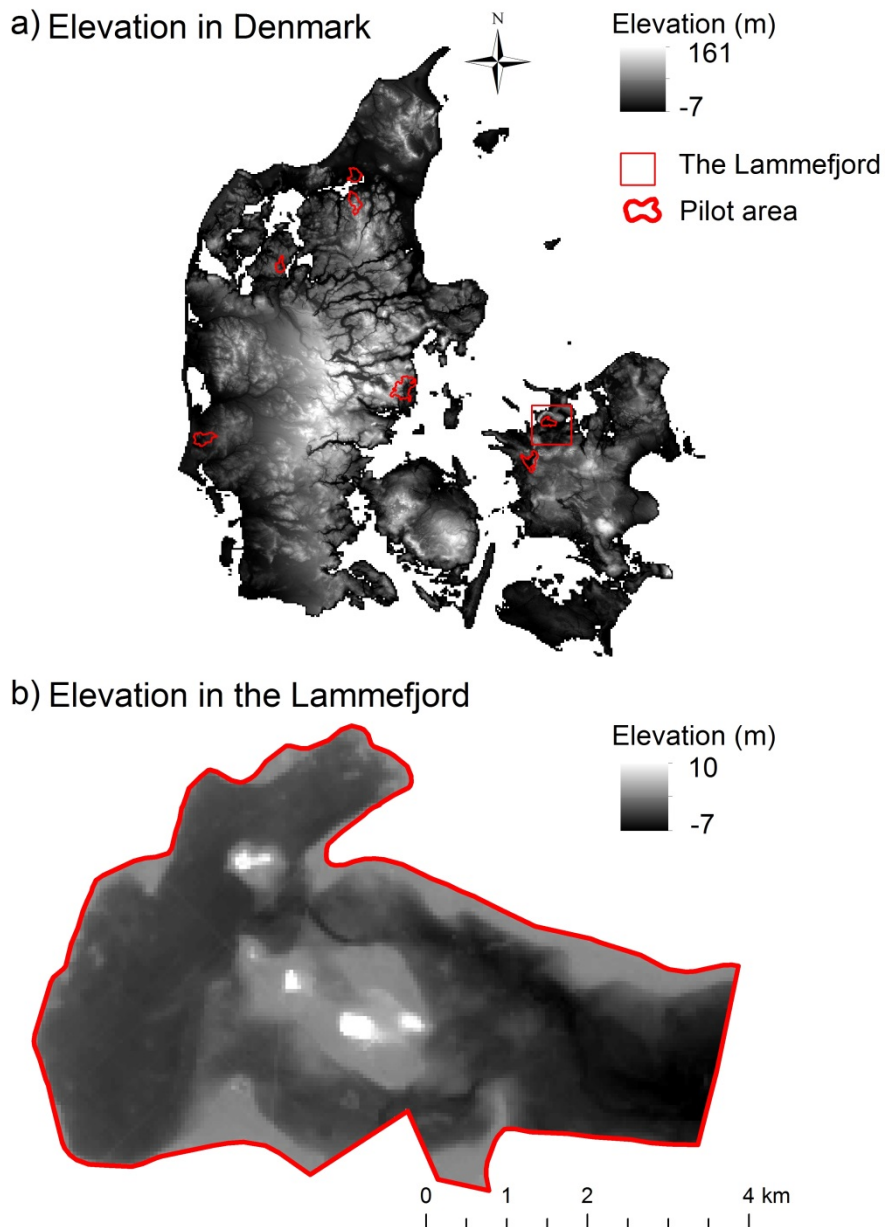
**Map 2:** Distribution of soil types in the pilot area the Lammefjord in 30.4×30.4 meters resolution.

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

Soil type	Area (ha)	Share of total area (%)
Coarse sandy soil	157	5.4
Fine sandy soil	517	17.8
Coarse clayey sandy soil	3	0.1
Fine clayey sand soil	491	16.9
Coarse sandy clay soil	0	0
Fine sandy clay soil	480	16.6
Clay soil	1194	41.2
Heavy clay soil	0	0
Very heavy clay soil	0	0
Silt soil	0	0
Organic soil	55	1.9
<b>Total</b>	<b>2897</b>	<b>100</b>

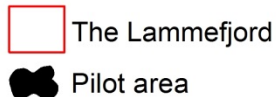
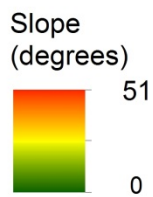
### 2.3. Terrain

With an elevation from -7 to 10 meters above the sea level (map 1) and a slope of the terrain from -7 to 10 meters the Lammefjord is one of the lowest lying areas in Denmark. This makes the area suitable for agriculture.

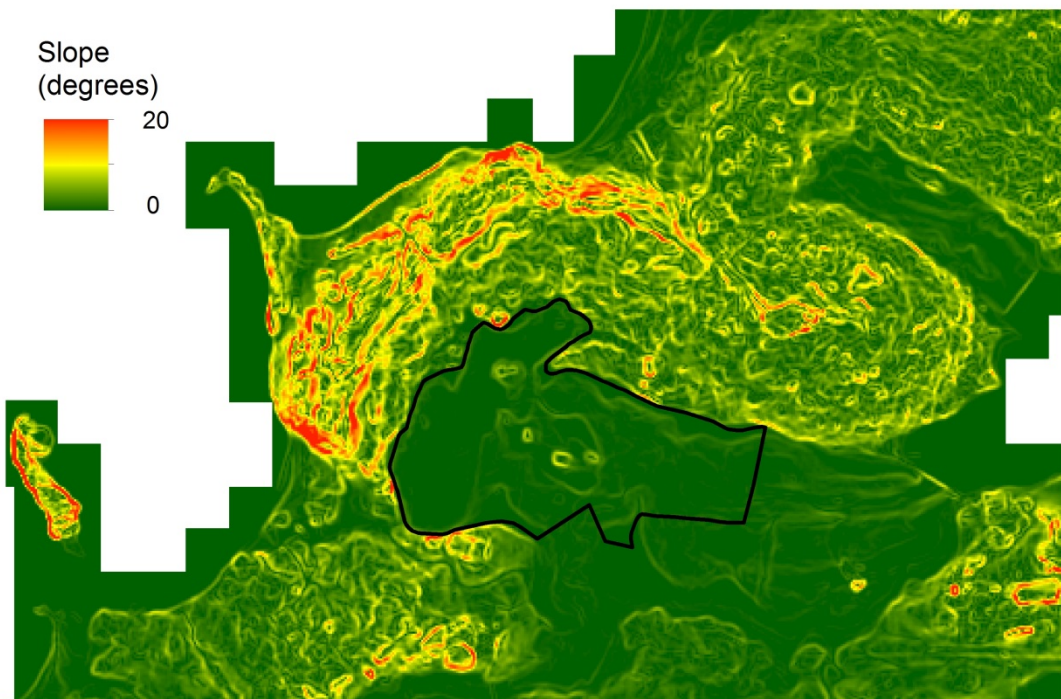
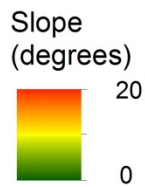


**Map 1:** Elevation in Denmark (a) and in the pilot area the Lammefjord (b) in 48×48 meters resolution.

a) Slope of the terrain in Denmark



b) Slope of the terrain in the Lammefjord

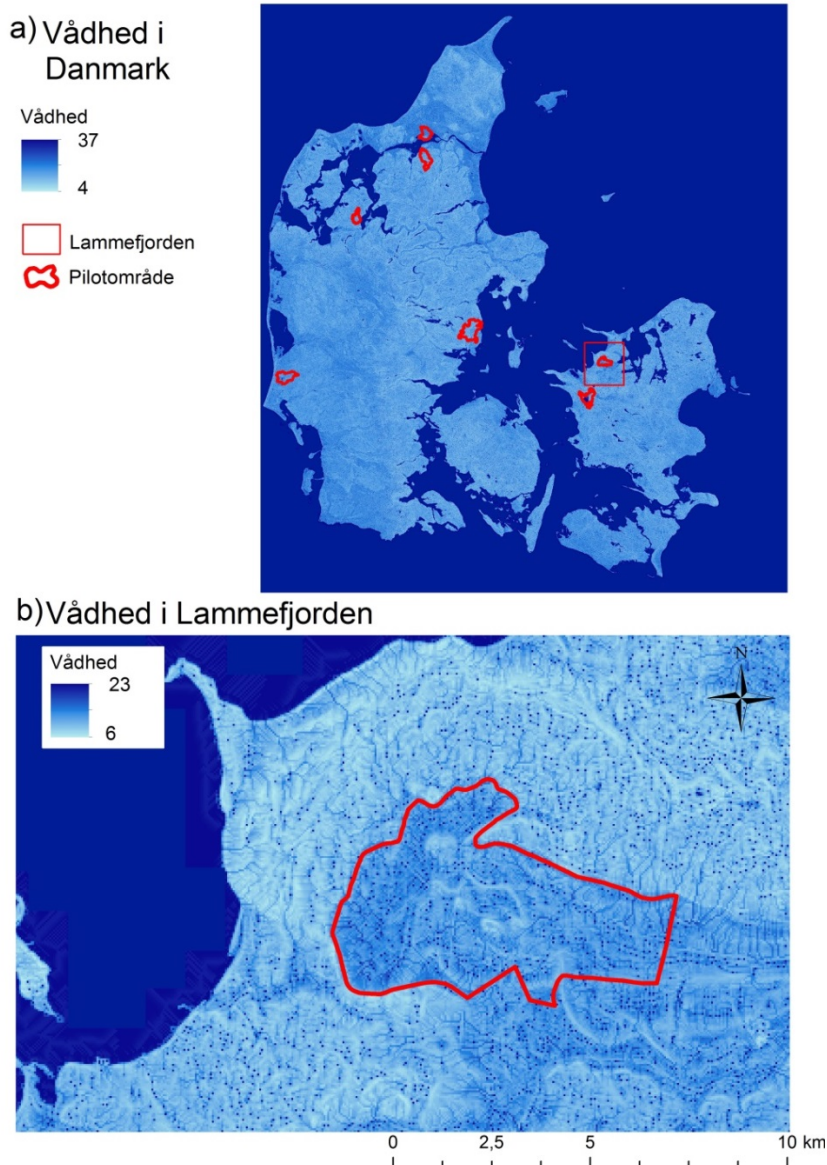


**Map 2:** Slope of the terrain in Denmark (a) and in the pilot area the Lammefjord (b) in 48×48 meters resolution

## 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 is delineated by the delta of the Lammefjord and is a relatively wet area.



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

### 3. References

- Adhikari, K., Kheir, R. B., Greve, M. B., Bøcher, P.K., Malone, B. P., Minasny, B., McBratney, A. B., Greve, M. H. 2013. High-resolution 3-D mapping of soil texture in Denmark. *Soil Science Society of America Journal*. 77(3): 860-876.
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