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OPtimal strategies to retAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe

How to map potential locations of measures

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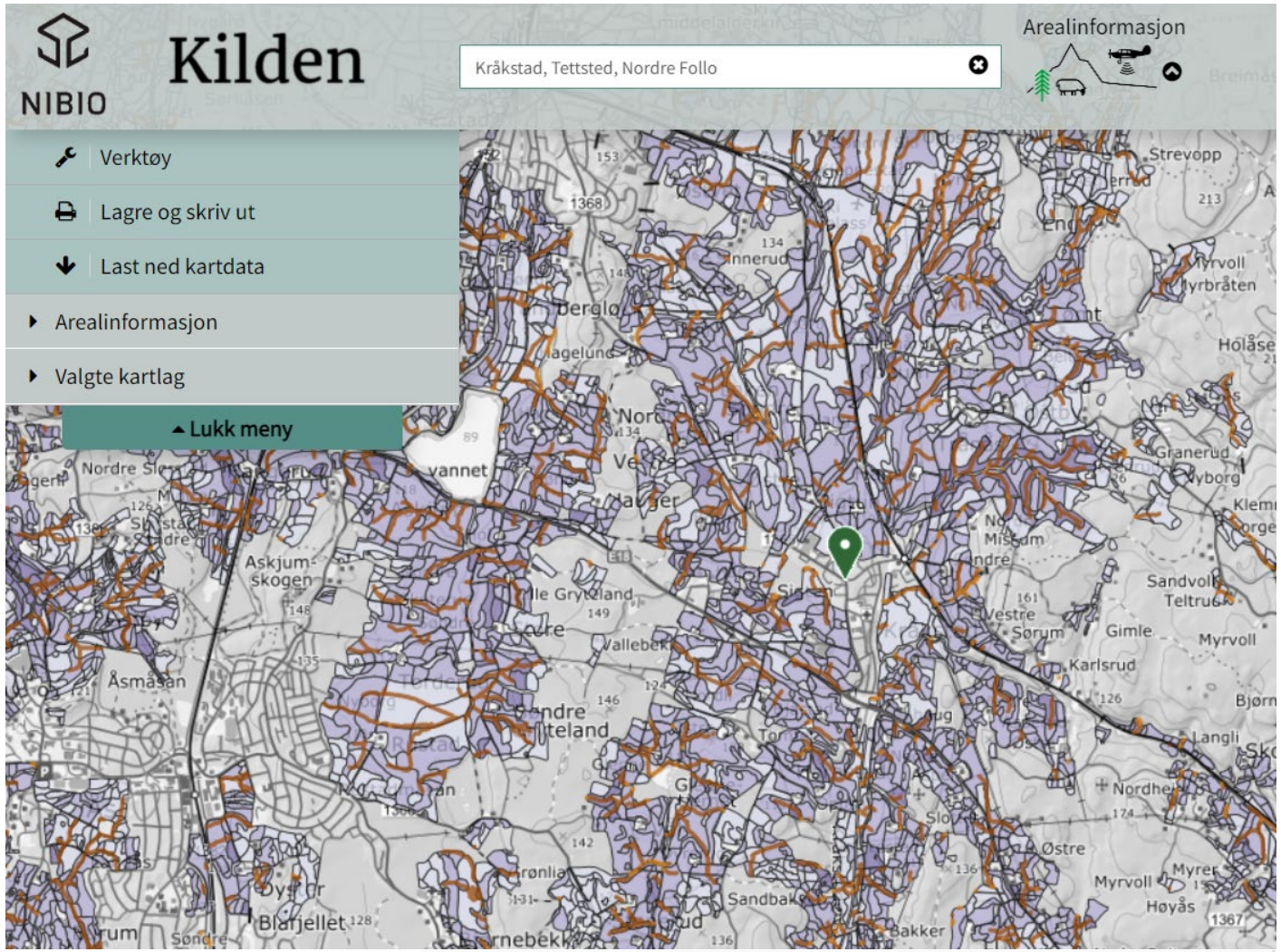
Measures for Kråkstad catchment

- Grass covered water ways
- Grass covered/no till in the areas with high erosion risk
- Grass covered buffer zones
- Sedimentation ponds
- Small constructed wetland
- Reduced tillage

Erosion risk map:

- Terrain map
- Land use map
- Soil map
- Erosion risk map



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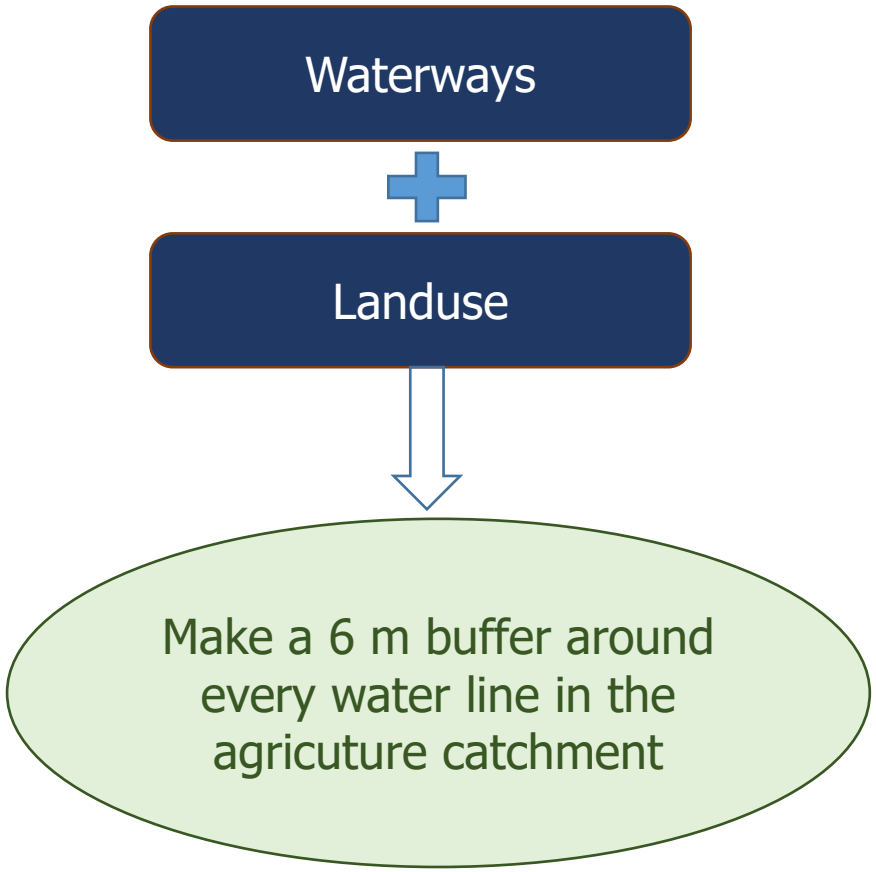
Erosion risk map:

- Terrain map
- Land use map
- Soil map
- Erosion risk map

- The maps accounts both **sheet erosion** and **gully erosion**
- Sheet erosion is calculated using a process-based model – PESERA, modified for Norwegian conditions
  - The amount of **sheet erosion** is calculated based on:
    - on surface runoff,
    - soil erodibility,
    - slope degree, and
    - slope length.
  - Soil loss through drainage pipes is included
  - The location of **gully erosion** features (not amount of soil!!!) is estimated based on terrain characteristics and surface runoff information

Potential location of grass covered buffer zone

Hobøl river, Norway (photos:D.Krzeminska)



Norwegian case study:

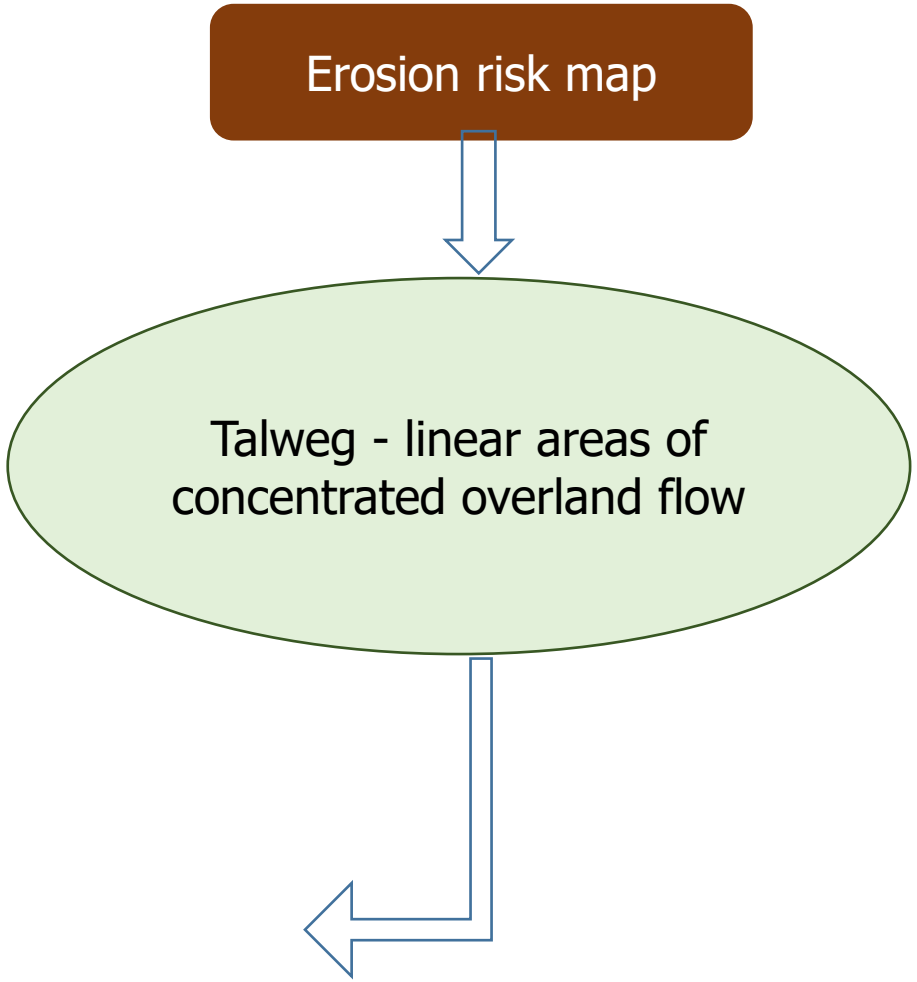
In Norway, the geodata source that represents surface waters best is FKB-vann (Kartverket, 2015).

Once the line and polygon elements are checked against aerial imagery, or another source of verification, a polygon is created by drawing a buffer with a certain width at either side.

NOTE: when there is existing forest/natural vegetation, we should not "change" it to grassed buffer zone

Potential location(s) of grassed waterways

Talweg - linear areas of concentrated overland flow



Norwegian case study:

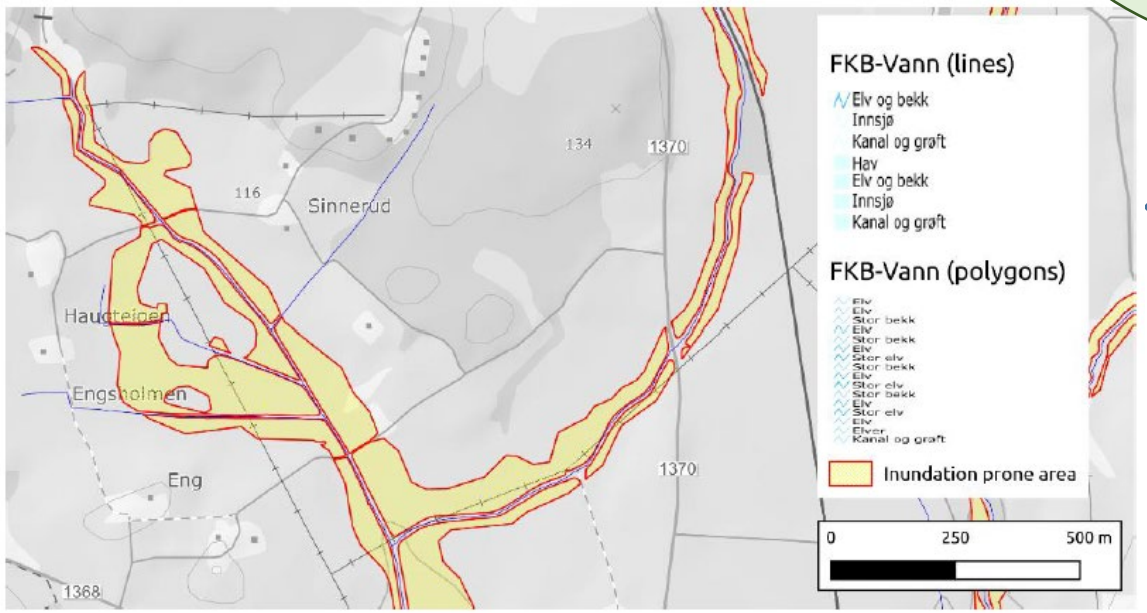
An ephemeral erosion risk map was developed by NIBIO and published in 2020 as part of the national erosion risk map (NIBIO, 2022).

The optimal placement of grassed waterways is therefore easily obtained by drawing a 6 m wide buffer with the existing gully erosion risk lines as the centre lines

➢ Potential location(s) for grass covered/no till in the areas with high erosion/flood risk

Waterways

Inundation prone areas *(often including buffer zones areas)*



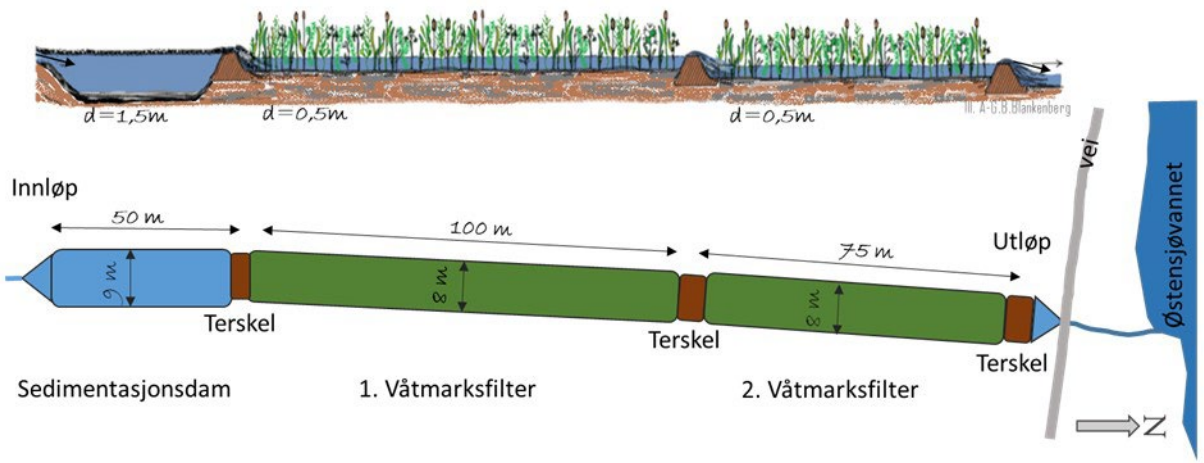
Part of NVE's map over flood prone areas.

Norwegian case study:

The Norwegian Water Resources and Energy Directorate (NVE) have undertaken mapping of inundation prone areas.

NVE publishes a series of nature related risks, among which an inundation risk map (NVE, 2021). The method behind the map is based on an assumed water level rise. If the sum of this storm level and the terrain level in the stream is then higher than the elevation of the adjacent areas, the area is classified as prone to inundation.

➢ Potential locations of (small) constructed wetlands



Technical drawing (A-G.B. Blankenberg)

Skuterud, Norway (D.Krzeminska)

Waterways

Landuse

Topography map
Geology map

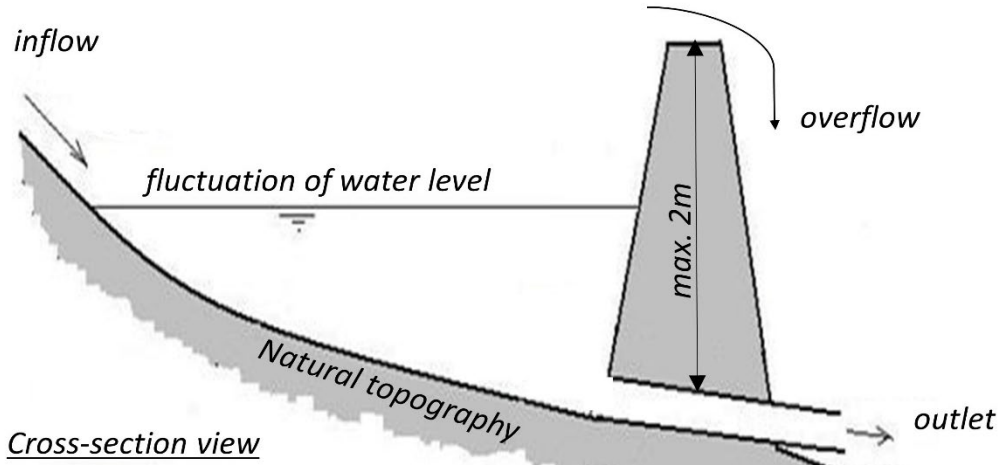
Find outlets from agricultural dominated sub-catchments with enough space to build constructed wetland

Norwegian case study:

Earlier research by NIBIO showed that the optimal location of a constructed wetland has a contributing area between 0.5 and 3.0 km².

The availability of a national Norwegian elevation model with a high spatial resolution (a 1x1 meter raster grid), provides the opportunity to assess the presence of naturally occurring depressions in the landscape. These depressions, or sinks, are a natural starting point for the detailed design of the basins that make up a constructed wetland.

Potential location of (small) retention ponds



Technical drawing(D.Krzeminska)

Svinndal, Norway (photos:D.Krzeminska)

Land use

+

Topography map

Find natural depression in the forested areas above the arable land

(to protect arable land)

Norwegian case study:

The initial mapping of locations starts with identifying sizeable sinks in the landscape. The availability of the 1 m Digital Elevation Model for Norway allows for the mapping of small and narrow sinks, which might not be detectable with lower resolution elevation data.

Then, the sinks suitability can be ranked according to the preferences set by the objective of the dams. In the example by Stolte and Barneveld (2020) retention dams were projected to protect agricultural land.

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