

## **Supplement:**

### **Details of DEM pre-processing for TWI calculation with references**

#### **Dataset title:**

Topographical Wetness Index for Finland (2016)

#### **Description:**

The Topographic Wetness Index (TWI) (Beven & Kirkby, 1979) was calculated for Finland in accordance to the multisource National Forest Inventory data resolution and grid (16m\*16m) (Luke MS-NFI, 2015). The calculation was conducted for a union of two Digital Elevation Models (DEM) (NLS, 2017) including the latest available 2m resolution DEM (status in June 2016) and the 10m resolution DEM. The combined DEM was clipped according to watershed areas (3rd level division)(Finnish Environment Institute, 2010) with 500m buffer to account for uncertainty in basin boundaries (Makinen, Sarjakoski, Oksanen, & Westerholm, 2016). Mean elevation value was used in aggregation to the MS-NFI grid. The pre-processing of the DEM and the calculation of the TWI were conducted in WhiteBox GIS programme (Lindsay, 2014) with python script looping through the 5637 watersheds. First the road and stream intersections (derived from NLS Topographical Database) were burned into the DEM to account for culverts. Then all water elements were burned into the DEM with 1 meter upper threshold and a decay factor accounting for possible mis-aligned stream data. The DEM was then handled with 'Fast Breach Depressions' tool that offers a good alternative to the traditional filling method to deal with artificial pits in DEMs (Lindsay, 2016). After, the flow direction and flow accumulation rasters were calculated with the D-infinity method (Tarboton, 1997) and the slope was calculated. The TWI was finally calculated and the lake areas derived from the topographic database were reset as NoData. For data sharing purposes, the TWI raster was multiplied by 1000 and cell values were converted to integer type.

#### **References:**

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**Keywords:**

Topographical Wetness Index, TWI