**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.

**References:**

Beven, K., & Kirkby, M. J. (1979). A physically based, variable contributing area model of basin hydrology. Hydrological Sciences Journal, 24(1), 43-69.

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Lindsay, J. B. (2014). The Whitebox Geospatial Analysis Tools project and open-access GIS. Proceedings of the GIS Research UK 22nd Annual Conference, University of Glasgow, 16–18 April. doi:10.13140/RG.2.1.1010.8962

Lindsay, J. B. (2016). The practice of DEM stream burning revisited. Earth Surface Processes and Landforms, 41(5), 658-668. doi:10.1002/esp.3888

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NLS. (2017). National Land Survey of Finland Topographic Database. Retrieved from http://www.maanmittauslaitos.fi/en/e-services/open-data-file-download-service

Tarboton, D. (1997). A new method for the determination of flow directions and upslope areas in grid digital elevation models. Water Resources Research, 33(2), 309-319. doi:10.1029/96WR03137

**Keywords:**

Topographical Wetness Index, TWI

**Field of Science:**

Natural Resource Management, forest sciences, agricultural sciences¨

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**Distribution:**

Paituli-paikkatietopalvelu, luke.kartta.fi

**Data availability:**

Access this dataset freely (if cited appropriately)

**Supplements:**

“Details of DEM pre-processing for TWI calculation”

**License:**

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**Citation:**

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**Geographical areas covered:**

Finland  
ETRS-TM35FIN: N 7774992,W 94624, E 733392, S 6637136

WGS84:  
West Bounding Longitude: 19.7937  
South Bounding Latitude: 59.6738  
East Bounding Longitude: 33.1164  
North Bounding Latitude: 69.9767

**Period of time covered:**

2m DEM status in 06/2016 + 10m DEM

**Project and funding information:**

Project name:   
FOTETRAF Advanced computational methodologies on open big data for forest terrain trafficability monitoring and forecasting

Funder:   
Academy of Finland

URL:   
https://www.luke.fi/projektit/fotetraf-sa-paatos-295337/

Funding ID:  
295337

**Additional information:**

File format .tif, .asc

Projection: EPSG:3067, EUREF-FIN, ETRS-TM35FIN

Resolution: 16\*16m

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