Greenness Accessibility Analysis (2005-2019)

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- **Table of Contents:**

1. AccessMod Merged Landcover:

- Used AccessMod to merge the landcover raster, road vector data and barriers datasets from the Ontario ministry of Natural Resources, into one single merged landcover raster layer to use for analysis. The order is listed below. For example, the local street is above the lake, so that people can cross the lake by walking over the street.

TOP
Ramp vOntarioRoad Data line
Rapid Transit vOntarioRoad Data line
Arterial vOntarioRoad Data line
Service vOntarioRoad Data line
Local Street vOntarioRoad Data line
Local Unknown vOntarioRoad Data line
Local Strata vOntarioRoad Data line
Winter vOntarioRoad Data line
Alleyway Laneway vOntarioRoad Data line
Resource Recreation vOntarioRoad Data line
Express Highway vOntarioRoad Data line
Freeway vOntarioRoad Data line
Collector vOntarioRoad Data line
vLake area
vRivers line
rLandcover grid
BOTTOM

2. **Facilities: Greenness Data**
    - The original greenness datasets vary by years from DMTI Spatial Inc.
    - The original greenness datasets are first processed using ArcGIS into the following five categories:
        - Forest: National park, national wildlife area, provincial park, sanctuary and protected area and other parks.
        - Park: Botanical garden, campground, picnic area, park sport field.
        - Limiting access: Golf park and zoo.
        - Cemetery: Cemetery
        - Omit: All others, including but not limiting to historic site, lookout, exhibition ground, etc.
    - We count the numbers of each classes above: in average
        - Forest: 1147
        - Park: 6664
        - Cemetery: 1230
        - Limiting Access: 533
        - Omit: 182
    - After, we further modified the greenness datasets using ArcGIS in order to be used in AccessMod, according to different travel modes, as follows:
        - Walking Mode: We started with polygon files of different greenness types and used ArcGIS pro to generate points along the boundaries of the polygon, in every 250m which matches the DEM resolution.
            - We manually omitted the points for the walking mode to nearest greenness, that were on 0-speed regions or barriers, because AccessMod can only process 18000 points at most. (the number of the ones that are choose or the ones to be omitted should not exceed 18000)
        - Bicycling and Motorized Modes: We started with polygon files of different greenness types and used ArcGIS pro to generate points where each polygon intersects the road data.

3. **Road Data:**
    - The road datasets are the Ontario Road Network (ORN) segment with address from the Ontario Ministry of Natural Resources. The data was sorted to different years based on its geometric effective date.

4. **Barrier:**
    - The datasets of lake and river were from previous analysis.
    - Folder Names: vLakes, vRivers

5. **DEM:**
    - We will use the DEM file in 250mx250m projection from previous analysis.

6. **Travel Scenarios: Travel Speeds on different layers**
    - The travel speeds for three different travel modes (walking, bicycling and motorized) under different land-use classes are as follows, in km/h:

Classes	Walking	Bicycling	Motorized
Clear Open Water	0	0	0
Turbid Water	0	0	0
Shoreline	2	0	0
Mudflats	2	0	0
Marsh	2	0	0
Swamp	2	0	0
Fen	2	0	0
Bog	0	0	0
Heath	2	0	0
Sparse Treed	2	0	0
Treed Upland	2	0	0
Deciduous Treed	2	0	0
Mixed Treed	2	0	0
Coniferous Treed	2	0	0
Plantations - Treed Cultivated	2	0	0
Hedge Rows	2	0	0
Disturbance	2	0	0
Cliff	2	0	0
Alvar	2	0	0
Sand Barren	2	0	0
Open Tallgrass Prairie	2	0	0
Tallgrass Savannah	2	0	0
Tallgrass Woodland	2	0	0
Sand/Gravel	2	0	0
Bedrock	2	0	0
Community/Infrastructure	5	5	0
Agriculture	2	0	0
Alleyway Laneway	5	13.5	40
Arterial	5	13.5	50
Collector	5	13.5	50
Expressway Highway	0	0	120
Freeway	0	0	100
Local Strata	5	13.5	50
Local Street	5	13.5	50
Local Unknown	5	13.5	50
Ramp	5	13.5	50
Rapid Transit	5	13.5	50

Resource Recreation	5	13.5	50
Service	5	13.5	20
Winter	5	13.5	50

7. **Maximum Travel Times Restriction:**
    - The maximum travel times are set for different travel modes to different greenness types as follow, in minutes:

	Forest	Parks	Cemetery	Limiting Access
Walking	60	30	30	30
Bicycling	180	90	45	45
Motorized	240	120	60	60

8. **Population Centers (Communities) and Cities Boundary Files:**
    - The population centers (or communities) and cities boundary files are available from the Statistics Canada, used to identify the community and city where a given postal code with longitude and latitude lies on.

9. **How to read the results:**
    - Postcode_yy: Six digits postal codes in a given year(yy)
    - Province, latitude, longitude
    - PCNAME: the name of the population center
    - Key_community: The number corresponding to the given PCNAME, 0 represents "no community identified"
    - CDNAME: the name of the city
    - Key_city: The number corresponding to the given CDNAME, co represents "no city identified"
    - Travel Time in minutes (XY):
        - X = W(Walking), B(Bicycling), D(Motorized)
        - Y = F(forests), P(parks), C(cemeteries), L(Limiting Access)