Analysis of structural connectivity between HCV forests

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Script
forest_new_v3.py

Description
This model creates input data to Omniscape for simulating structural connectivity between HCV forests in a given study area and post-processes the output from Omniscape into 10 m connectivity maps with value 0-10, indicating the degree of structural connectivity (the higher the stronger).

Running this script requires a working installation of GRASS GIS with input data with specific names placed in mapsets with specific names, as detailed below. You also need to update some paths in the script to match your own file structure. The script can be run from outside GRASS GIS, e.g., from within an IDE of choice.

Main mapset
connectivity_forest_new

Necessary preparations

1. Update NMD using the script update_NMD.py (see separate documentation)
2. Generate raster data on protected, restricted and continuity forest using the script HCV_kskog.py in mapset *HCV_kskog*
3. Generate raster data on density of protected, restricted and continuity forest within a 250 m radius, using skogliga_vardetrakter.py (requires additional scripts, see documentation), in mapset *density_analysis*

Necessary input data
To be placed in mapset **connectivity_forest_new**

1. **nmd_gen_sv_updated@update_NMD**
   - NMD updated with recent fellings and transmission lines, generated using update_NMD.py, located in mapset update_NMD
2. **input_study_area_raw_[region]**
   - vector data representing the study area. There can be multiple study areas. They should have the same name except for [region]
3. **out_input_HCV_kskog_forest_final@HCV_kskog**
   - Raster data on protected, restricted and continuity forest. Generated by HCV_forest_areas.py, located in mapset HCV_kskog
4. **result_density_forest_HCV_kskog_NB_250m_v2@density_analysis**
   - raster data (10 m) on density of protected, restricted and continuity forest within a 250 m radius. Generated by skogliga_vardetrakter.py, located in mapset density_analysis

Input parameters in GUI

- **Region**
  - Name of the study area. Should match "region" in the input data **input_study_area_raw_[region]**
- **Buffer**
  - Size of the buffer (m) added to the study area to avoid edge effects.
- **Suffix**
  - Optional suffix to the output file name
- **Wetland forest**
  - Resistance value for forests on wetlands that is not identified as protected, restricted or continuity forest. Defaults to 15. Should not be 12 or lower as this is the maximum resistance value generated for protected, restricted, and/or continuity forest.
- **Other natural vegetation**
  - Resistance value for "other natural vegetation". Defaults to 20.
- **Other forest**
  - Resistance value for "other forest", i.e., forests that are not recently harvested and that does not qualify as protected, restricted or continuity forest or wetland forest. In general this means production forest. Defaults to 50
- **Non-natural vegetation**
  - Vegetation that has been substantially modified, i.e., recently harvested forests, agriculture, and vegetation under transmission lines. Defaults to 150.
- **No vegetation**
  - Non-vegetated land. Defaults to 300.

Output data

- out_[region]_calc_resistance_[suffix]
  - where [region] and [suffix] is specified in model GUI.
  - Resistance layer (raster, 10 m) for the specified , saved as grass raster and exported to geotiff and ascii (input to Omniscape).
- out_[region]_calc_resistance_20m_[suffix]
  - Same as above but with 20m resolution

Post-processing

After running the Omniscape simulations using the output data described above, the script can post-process the (normalized) cumulated current maps and generate 10 m connectivity maps with values 0-10. This is the final result of the model.

Usage

1. Run the script from a GRASS console within the given mapset to open the GUI.
2. Specify the input parameters (important: save buffer and suffix before saving region)
3. Press "Prepare datasets" (this is only necessary once for each region, buffer, and suffix)
4. Press "Compute resistance layer"
5. Use the output data to run Omniscape
6. Press "Run post-processing" and browse to the output data from Omniscape

Updating the analysis

For updates in NMD: rerun update_NMD.py and then run the model

For updates on protected, restricted and continuity forest: rerun HCV_kskog.py (see separate documentation) and density_analysis.py (see separate documentation) and then run the model (the name of input data 3 and 4 may change – update the script if necessary).

For updates on density analysis methods: update and rerun density_analysis.py and then run the model (the name of input data 4 may change – update the script if necessary)