# Section : 7. Raster

Module : 7.5. Stream catchment delineation

ℹ️ Stream catchment delineation Context

> *"DEM(digital elevation models) represents raster data where each cell value depicts elevation"*

From DEM we generate useful by-products which can help us understand the terrain. Example of products generated from DEM's are slope, aspects map.

In this module, we explore how to derive drainage maps and delineate a catchment area from
the DEM.
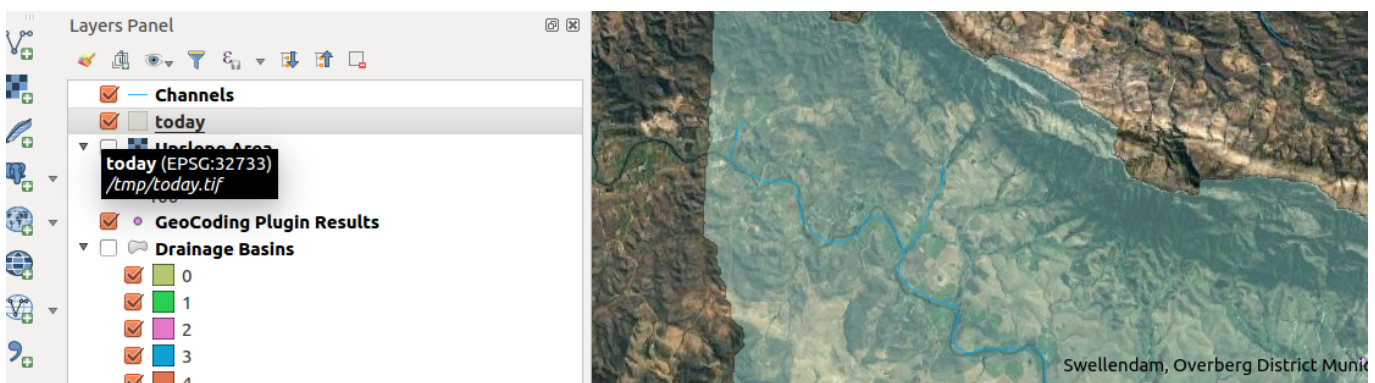
You try:

Goal: To determine the streams and catchment area for swellendam.

Data: SRTM

- Load the DEM
- Run the fill sinks (save the filled dem and flow direction outputs only)
- Apply the flow style to flow direction layer
- Run the strahler alg and use the filled dem as input.
- Create a boolean raster using the input raster from the strahler alg output.
- Symbolize the boolean raster generated in the previous step into two distinct classes.
- Assign an additional no-data value 0 on the boolean raster.
- Run channels alg with Filled Dem as the input. Set the threshold to 8. (save channels and drainage basins only)
- Install the Geocode plugin
- Search Swellendam using geocode plugin
- Zoom to a river near the point added by geocode plugin.
- Use coord capture plugin to capture a point along the vector river.
- Use the slope alg. Substitute x,y for values in the coordinate capture. Use values representing correct CRS of the raw raster layer.
- Proceed to generate the catchment and streams as vector layer.

Name	Expectation

Fill sinks algorithm	Fill sinks (wang and liu)
Flow style	d8_flow_directions.qml
Strahler alg	Strahler order
Raster calculator in Context	"strahler@1" >= 7
Channels alg	Channel network and drainage basins
plugins	Coordinate capture,geocoding
Slope alg	Upslope area

More about

Raster data is pixel based and it includes aerial and satellite imagery. Raster data can be classified as continuous and discrete. Population density represents discrete raster while elevation and temperature represents continuous data.

Digital elevation represents a thematic raster where each cell values depicts the height above sea level. Raster datasets can be processed to derive other products e.g. slope, aspect map from DEM. For satellite raster, users can process the layer to derive land cover maps and land use maps.

Geoprocessing analysis is performed to recondition the digital elevation model and generate data on flow direction, flow accumulation, streams, stream segments, and watersheds. These data are then be used to develop a vector representation of catchments and drainage lines from selected points that can then be used in network analysis

Check your knowledge:

1. What does the abbreviation DEM stand for:
    a. *Data emission problems.*
    b. *Digital elevation Movie*
    c. *Digital elevation model*

2. Which of these represents a derivative of a digital elevation model:
    a. *A satellite image showing mountainous areas.*
    b. *A slope curvature map that is used by surveyors to determine the direction at which the sun shines*
    c. *A vector data that represents natural phenomena.*

3. Are plugins accessible in the processing toolbox of QGIS:
    a. *True*
    b. *False*

Further reading:

- Terrain_analysis_channels   http://docs.qgis.org/2.14/en/docs/user_manual/processing_algs/saga/terrain_analysis_channels.html

- Terrain_analysis_hydrology: http://docs.qgis.org/2.14/en/docs/user_manual/processing_algs/saga/terrain_analysis_hydrology.html#upslope-area
- Basic_grid_analysis_tools: http://docs.qgis.org/2.14/en/docs/user_manual/processing_algs/taudem/basic_grid_analysis_tools.html

Download the sample data for the lesson from http://changelog.inasafe.org/media/images/lesson/worksheet/external_data/8e1363b32ed127b96e91f89f7dd0d7330464e154.zip.