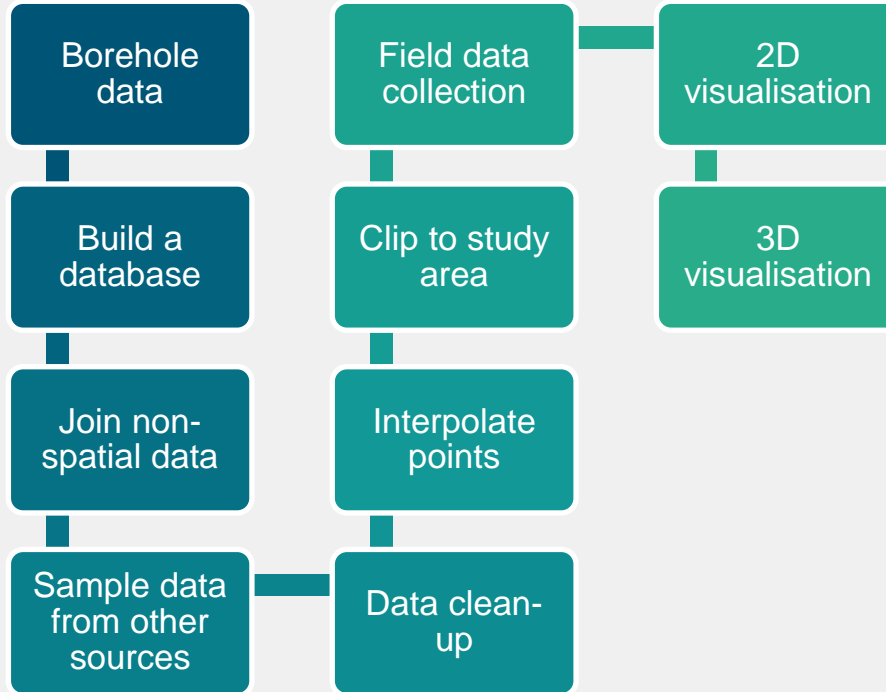# QGIS for Groundwater Applications

Preprocessing and collecting groundwater data

Hans van der Kwast (IHE Delft)

Workflow for preprocessing groundwater data

Where to get data?

Spatial Data Infrastructures (SDI)
Enabling environment that supports easy access to and utilization of geospatial data.

SDIs are more than just data repositories:
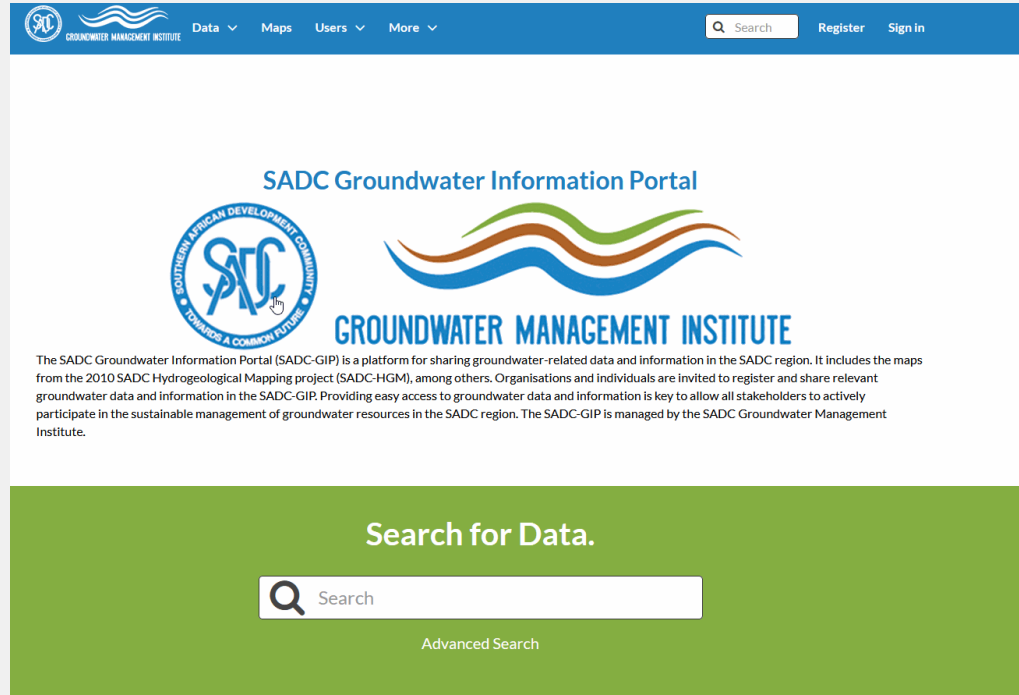   **Discovery**
    catalogues, search engine
    Visualization
    interactive maps, infographics,
    real time data, etc.
    Evaluation
    quality, metadata
    Access to geospatial data and information
    web-based, apps, services, GIS
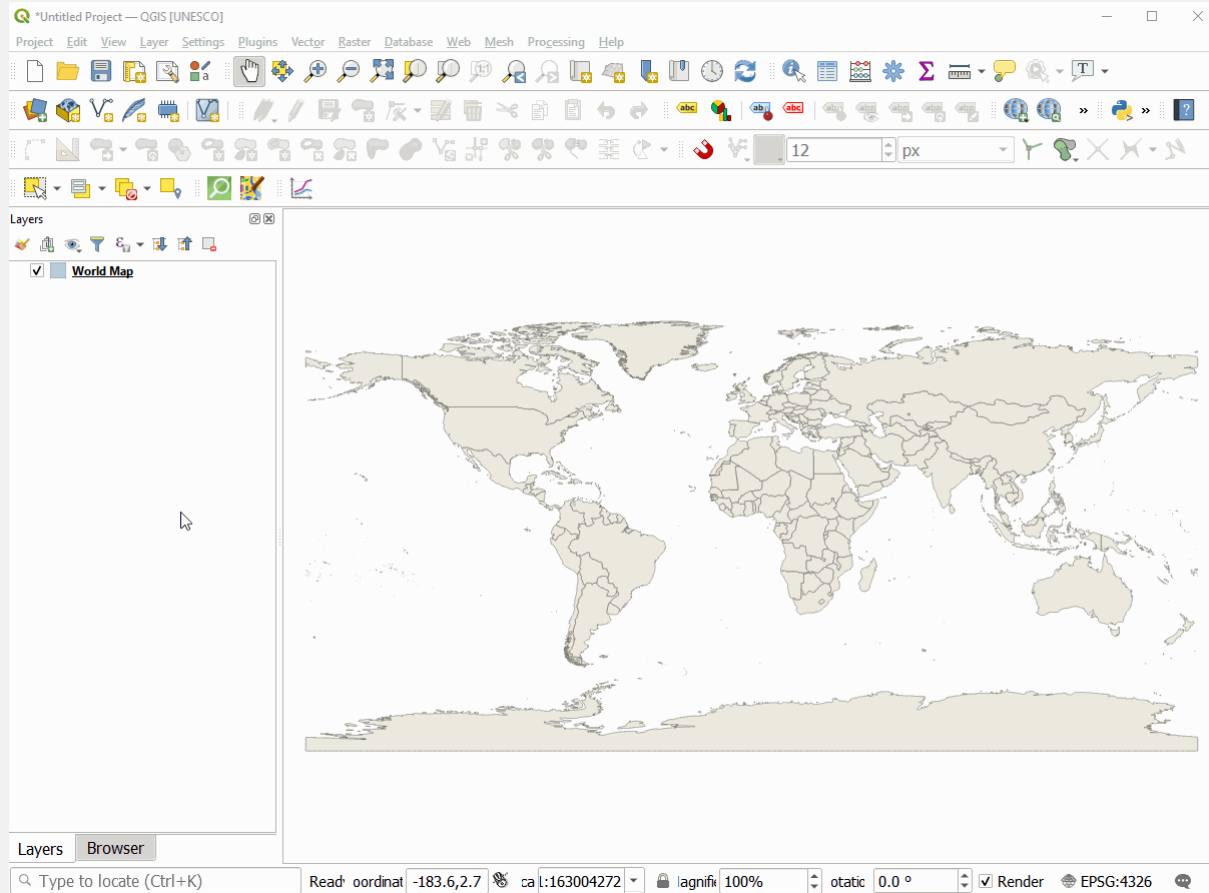

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SDI and GIS

Sharing of:
- Spatial data
- Metadata
- Documents (e.g. Open Access papers)
- Profiles (social media)

SDI and QGIS

Australian Groundwater Explorer

http://www.bom.gov.au/water/groundwater/explorer/map.shtml

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Case study: Namoi River

Mgillaus, CC BY-SA 3.0, via Wikimedia Commons

Data
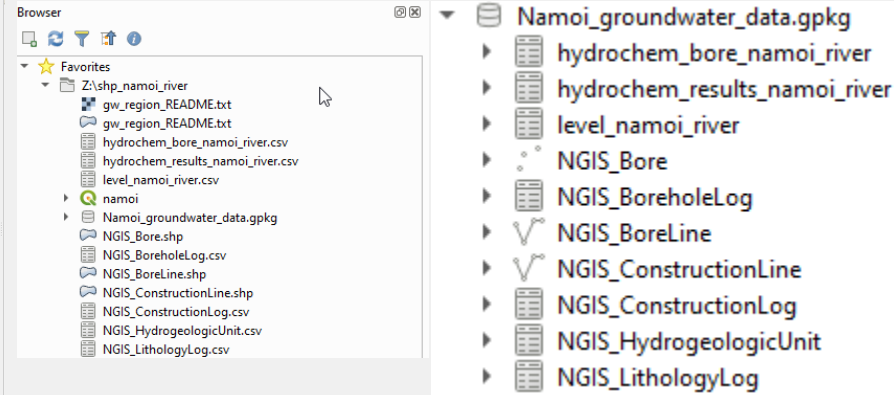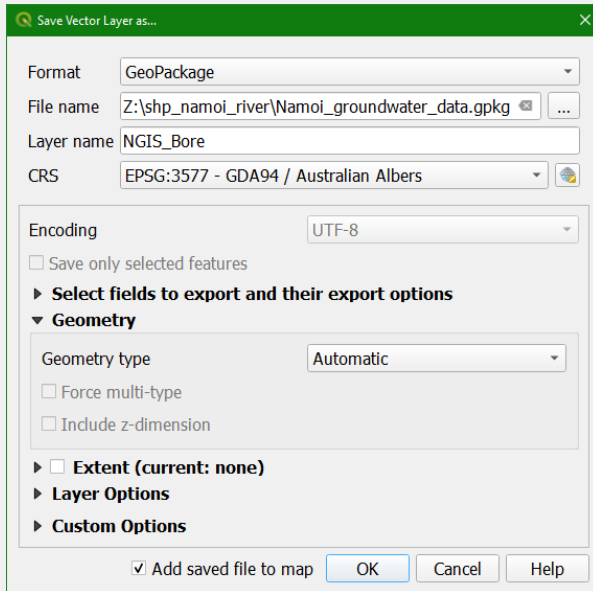

From gw_region_README.txt:

- NGIS version 1.6 extract
- Water level measurements:level_<river_region>.csv
- Salinity measurements: salinity_<river_region>.csv
- Hydrochemistry bore locations and attributes: hydrochem_bore_<river_region>.csv
- Hydrochemistry measurements: hydrochem_results_<river_region>.csv
- Product release notes: gw_river_region_README.txt (this file)

For shapefile format, the following NGIS data is available:
- bores
- lithology logs
- construction logs
- hydrostratigraphy (bore) logs
- hydrogeologic unit table
- management zones
- aquifers

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Build database

- Create a new GeoPackage

Join non-spatial data

Join non-spatial data

Sample data from other sources

- TsRefElev: 0 = no data

- Replace with elevation from DEM

https://elevation.fsdf.org.au/

Extract layer extent

DEM tiles

Selecting an area   ✕

Select an area of interest. By hitting one of the "Draw" buttons an area on the map can be selected with the mouse by drawing a bounding box, drawing a polygon or manually typing in the minimum and maximum of latitude and longitude. Hover over the buttons to see more information.
Clicking one of the "Draw" buttons again allows replacing a previous area selection.
Notes:
- The data does not cover all of Australia.
- Restrict a search area to below 1.5 degrees square. eg 2x0.75 or 1x1.5

Hint: If the map has focus, you can use the arrow keys to pan the map. You can zoom in and out using the mouse wheel or the "+" and "-" map control on the top left of the map. If you don't like the position of your drawn area, hit the one of the "Draw" buttons to draw a new search area.

Select area by:
Selected bounds: 148.0000° west, -29.5000° north, 149.5000° east, -31.0000° south

Select all   AHD (Showing 6,422 of 6,422)   [show list]

Geoscience Australia (Showing 26,494 of 26,494)

DEMs

Select all   1 Metre (Showing 9,952 of 9,952)   [show list]

Select all   5 Metre (Showing 1 of 1)   [show list]

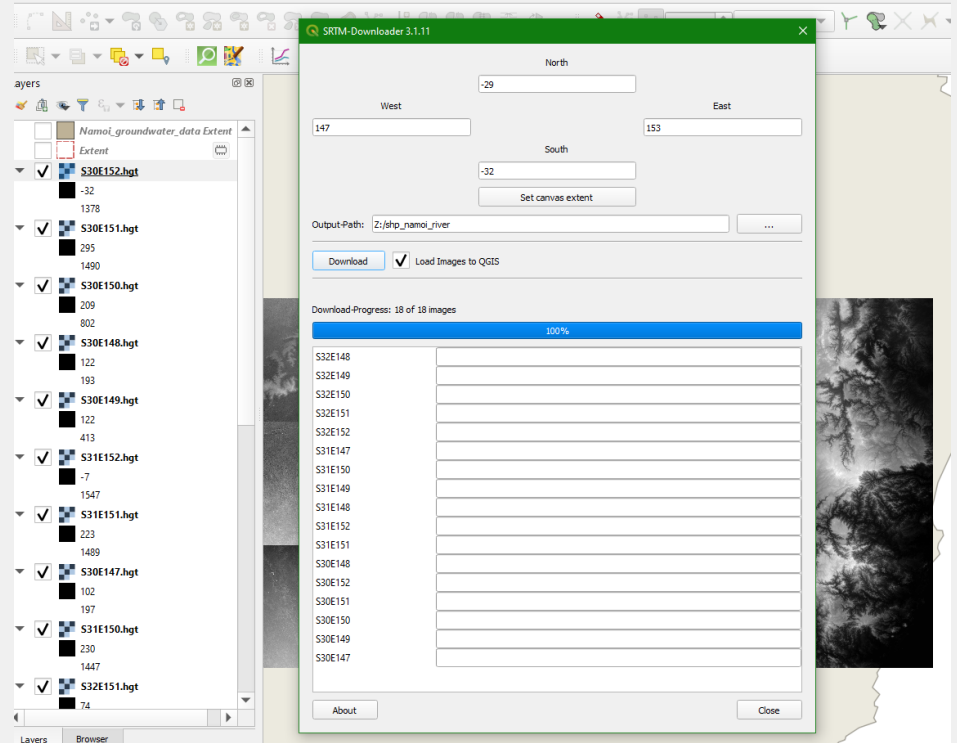Select all   1 Second (Showing 3 of 3)   [show list]
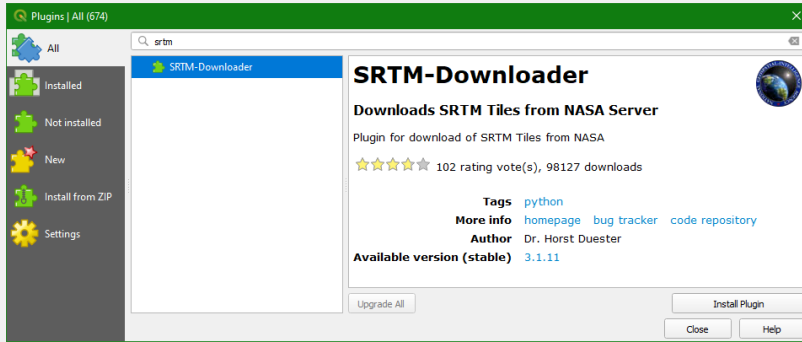
DSMs

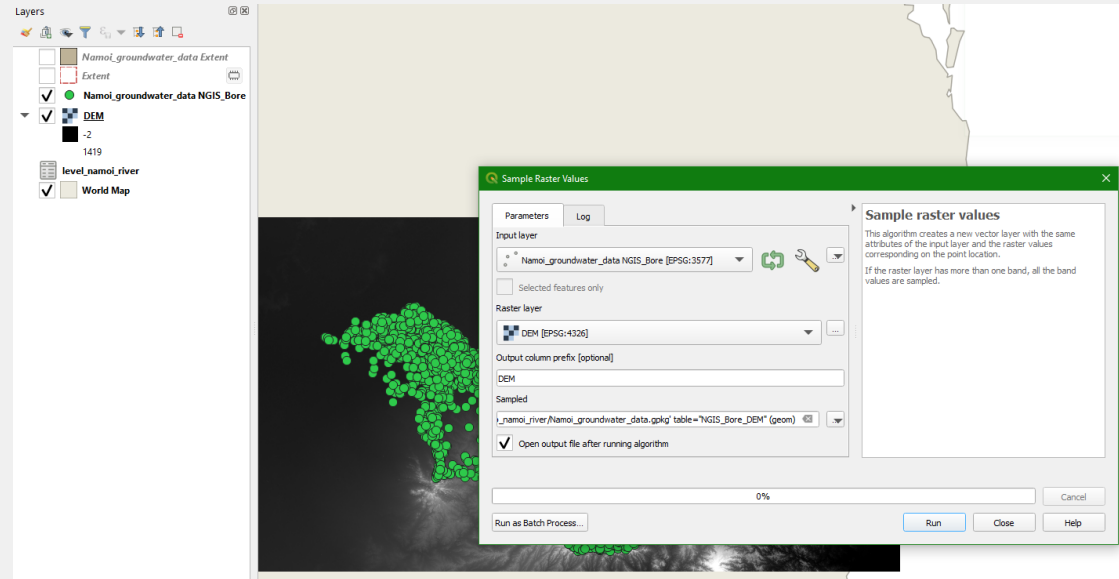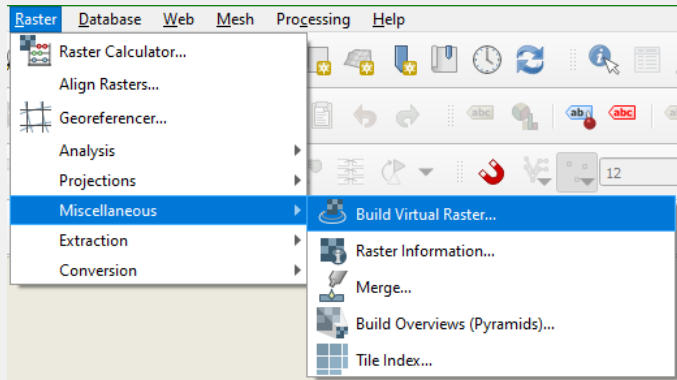Select all   1 Second (Showing 1 of 1)   [show list]

Point Clouds

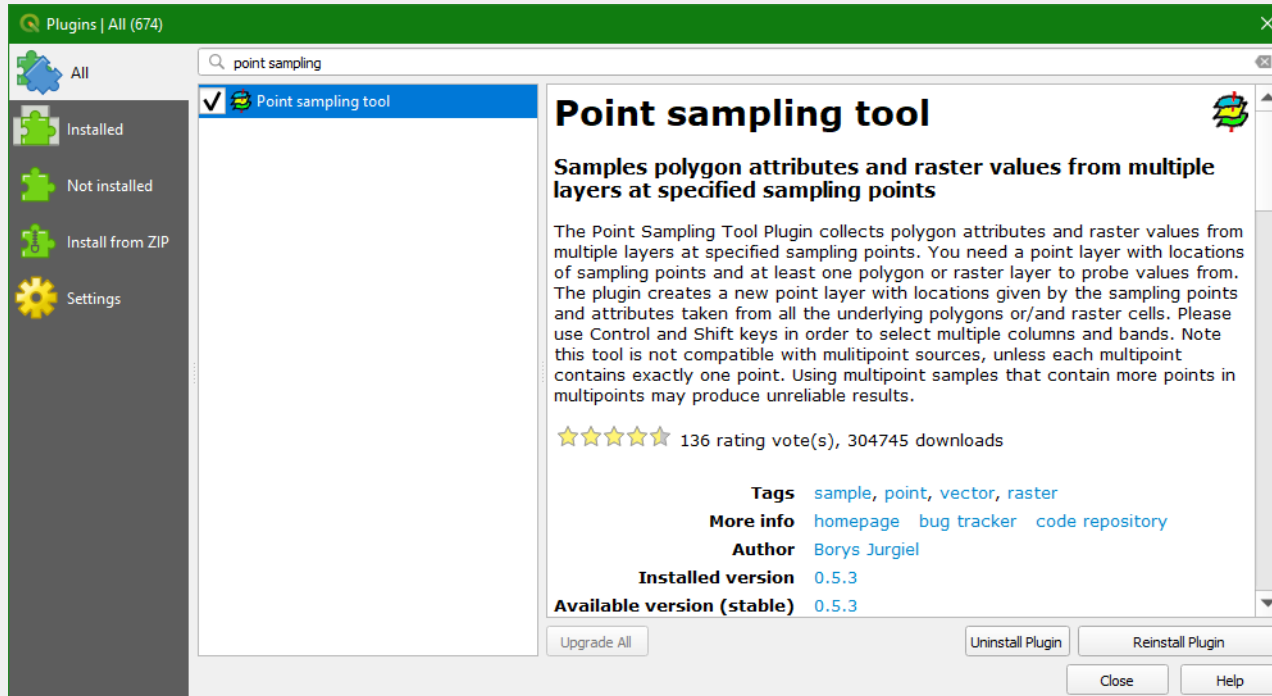Select all   Ellipsoidal (Showing 8,003 of 8,003)   [show list]

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SRTM-Downloader plugin

Build Virtual Raster

Point sampling tool

Sample Raster Values

Data Clean Up – remove NULL values
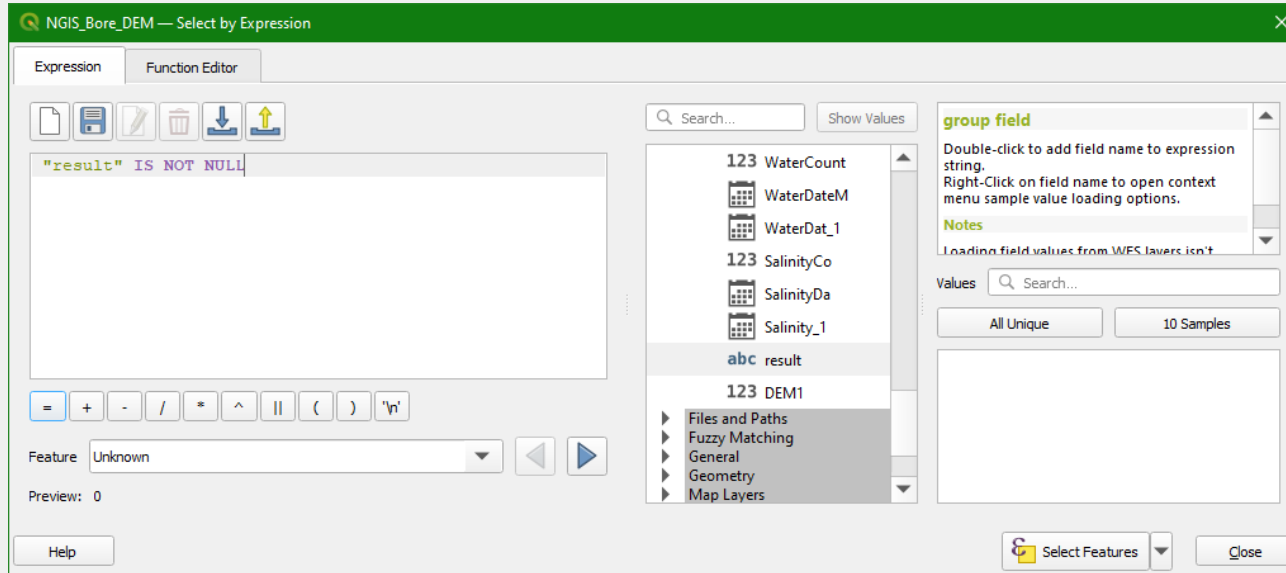
1. Select all water levels
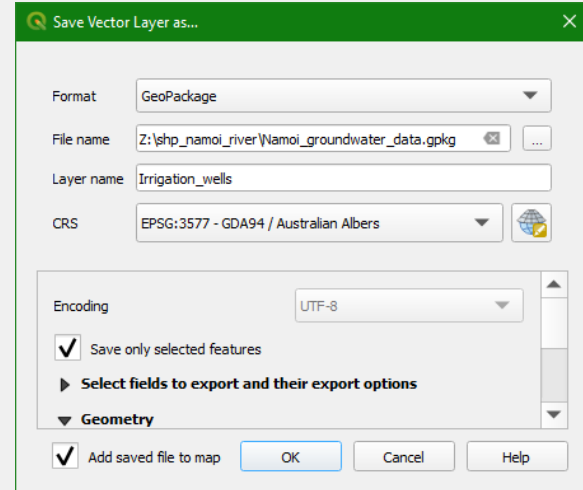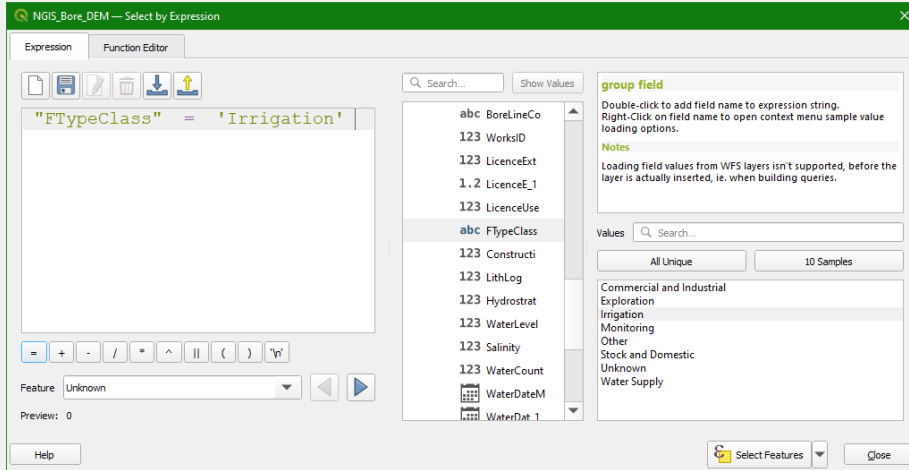2. Export selected features to GeoPackage

Data Clean Up – Replace 0 elevation values

Calculate Water Elevation
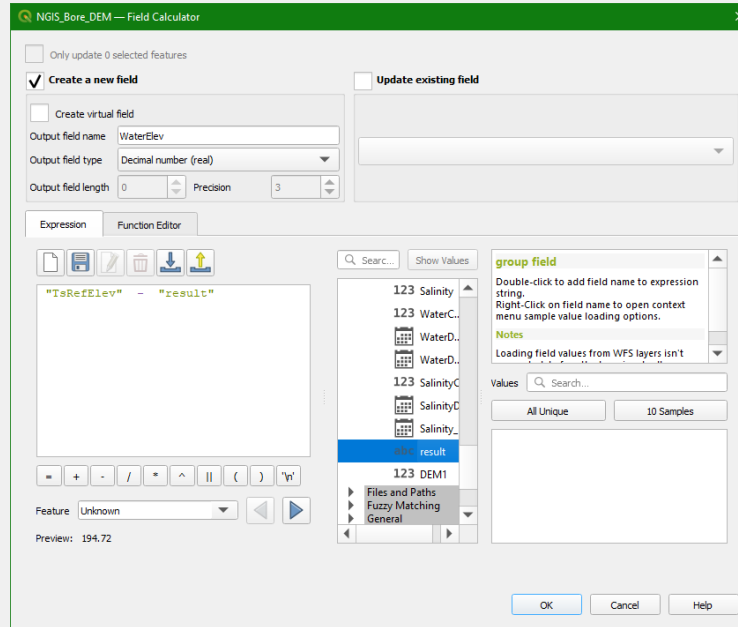
WaterElev = TsRefElev - Water_Level

Select boreholes

Spatial Interpolation (IDW)
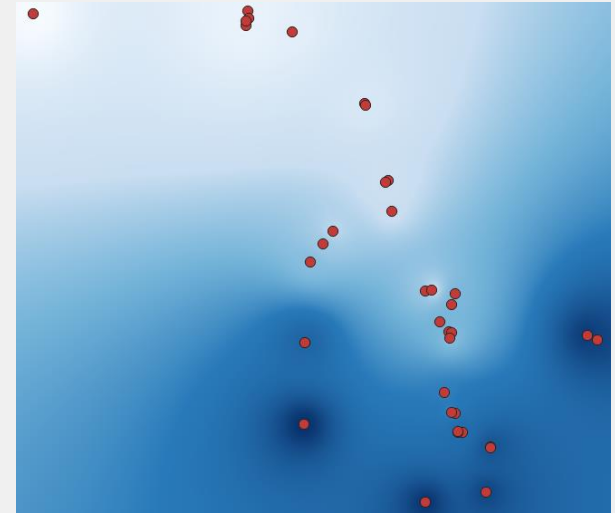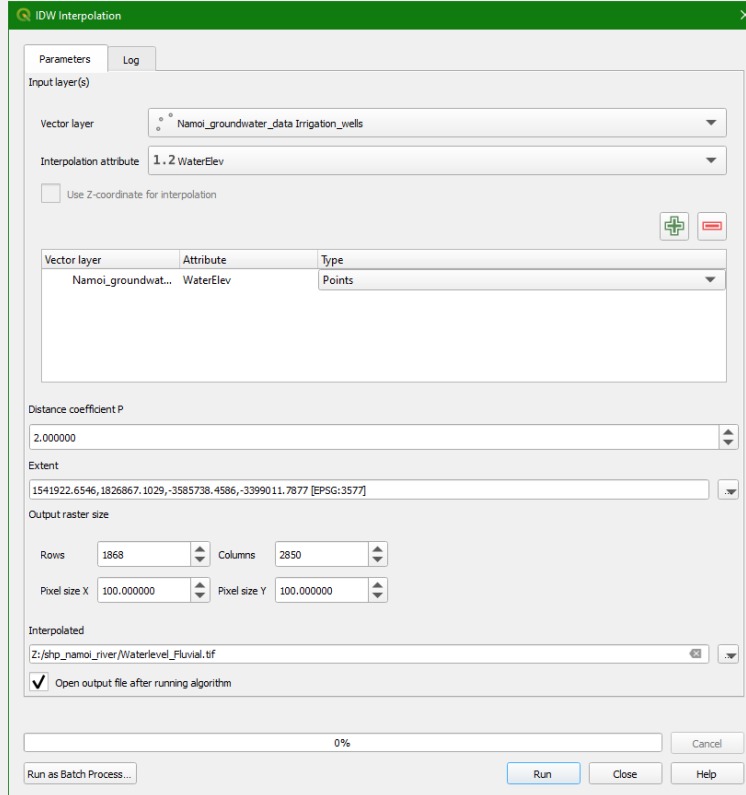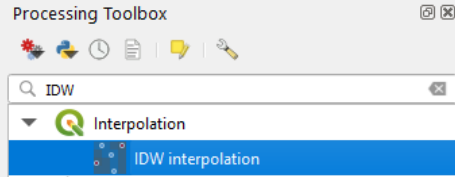
Spatial Interpolation (Thiessen)

Clip to study area

- Aquifer

- Alluvial deposits → Buffer
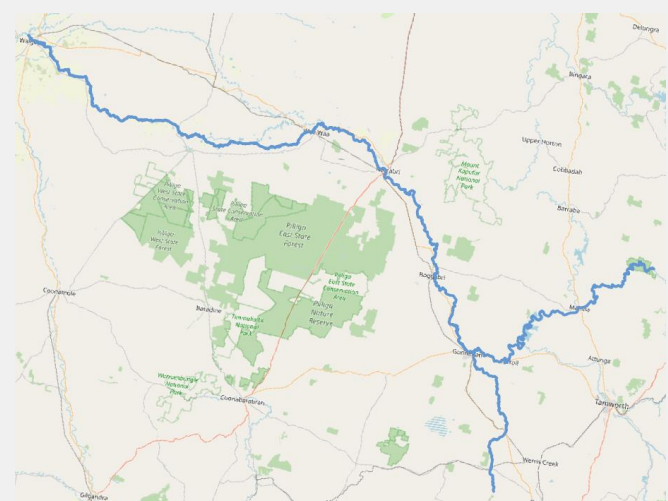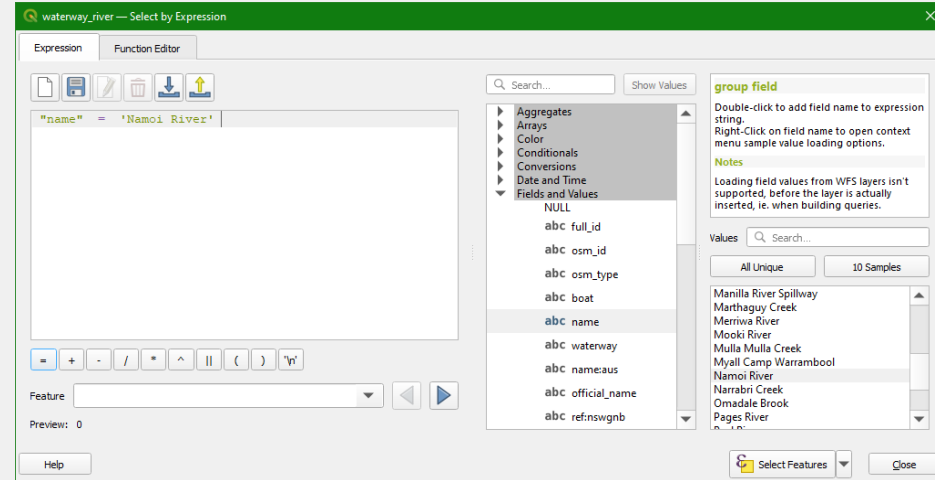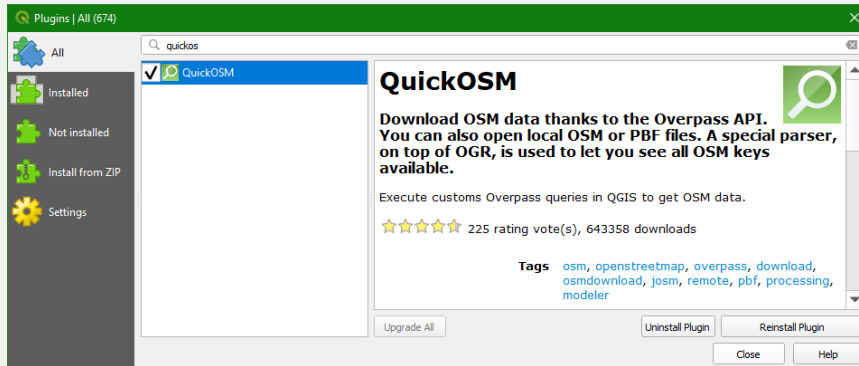
Buffer of 10 km

Goundwater level in the study area

Field data collection for groundwater studies

- For groundwater studies we often need to map features in the field, such as:
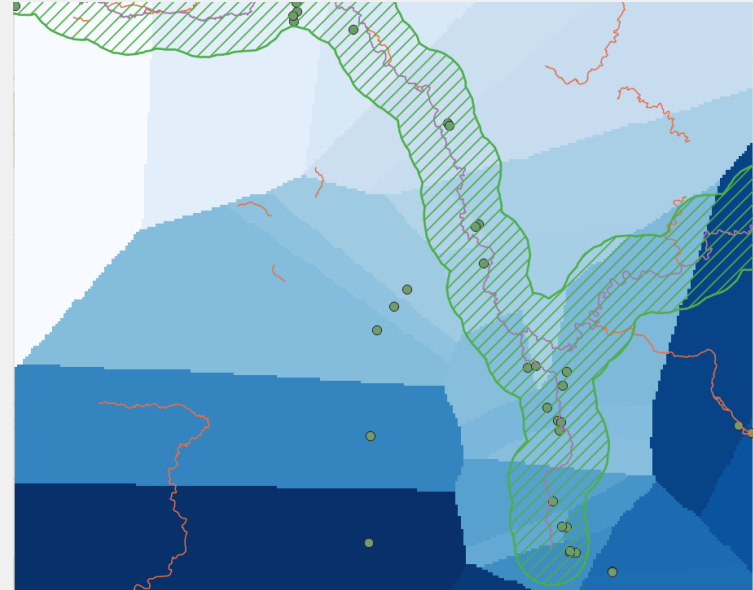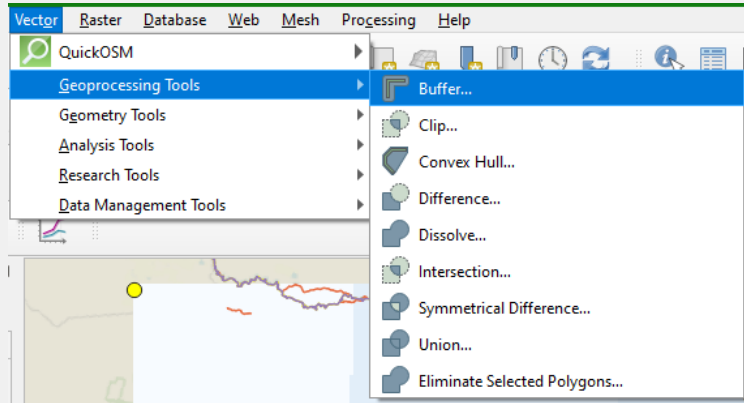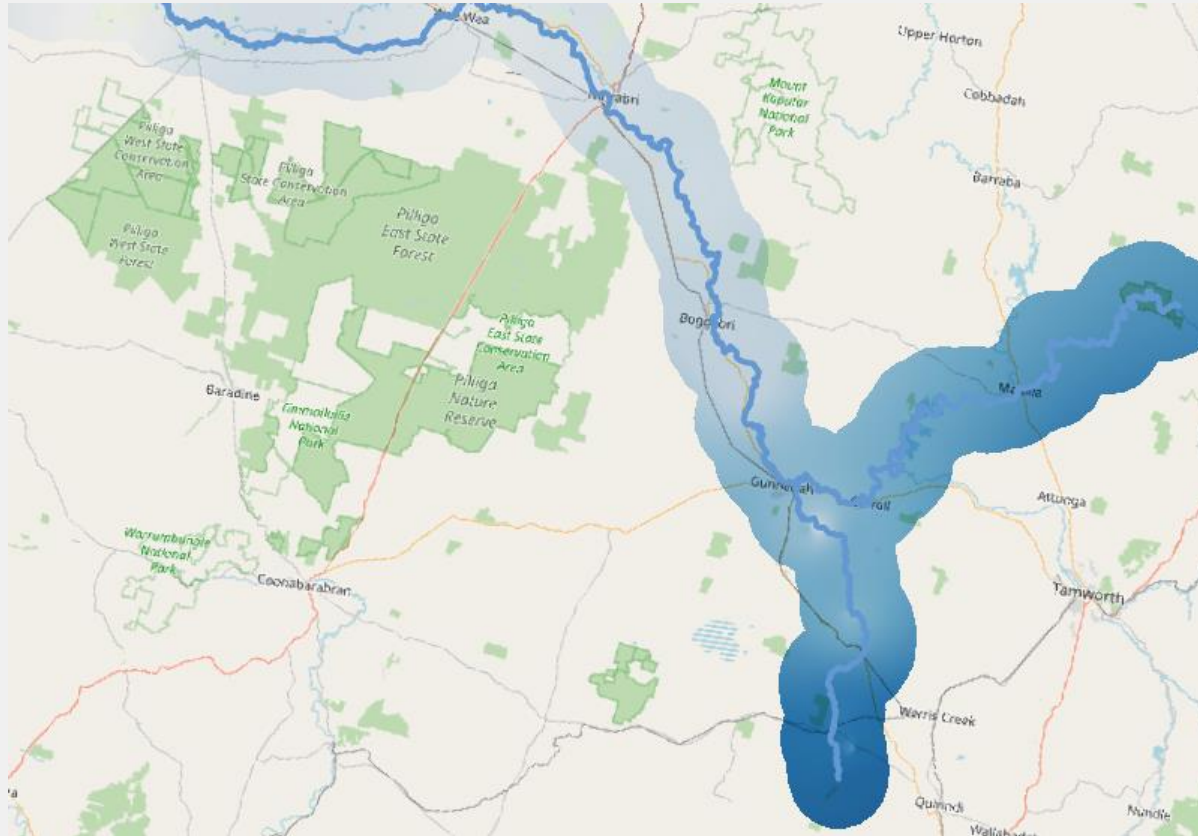
  - Springs

  - Wells

  - Boreholes

- We also want to map properties of these features, such as:

  - Unprotected/protected springs

  - Depth of the well/borehole

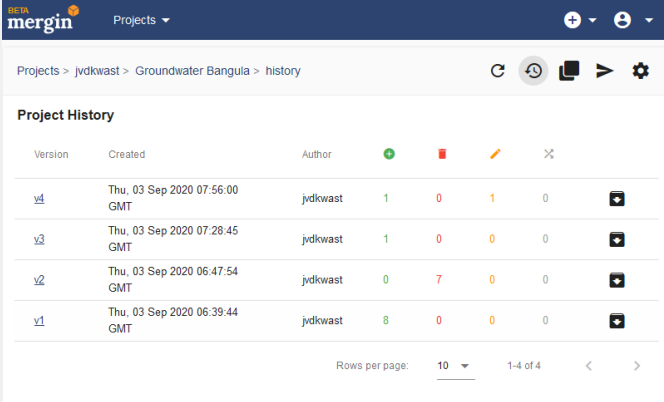 - Water level of well/borehole

  - Water quality

Input App

- Developed by Lutra Consulting (https://www.lutraconsulting.co.uk/)
- Designed to be compatible with all mobile devices
- Available in Google Play Store and App store
- Free and Open Source
- Support for custom forms
- Capture location-related media (photos/video)
- User friendly
- Support for external GPS receivers
- GPS accuracy setting
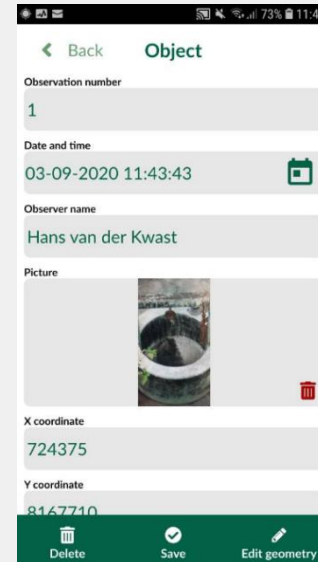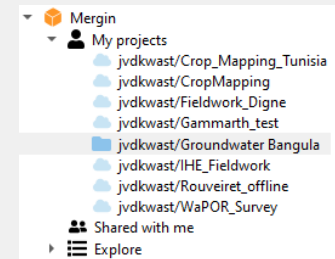
Mergin cloud service

- Collaborative space allowing you to store and synchronise projects across multiple mobile and desktop clients

- Version management

- Clone projects

- Share projects with other users
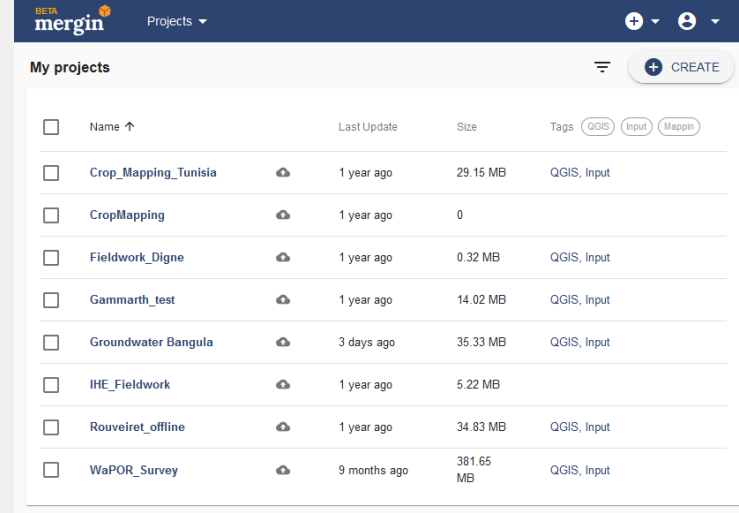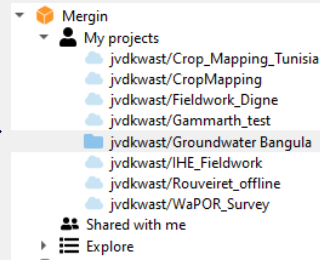
- Web client

- QGIS plugin

Workflow QGIS – Mergin - Input

Workflow QGIS – Mergin - Input

gisopencourseware.org

Questions?