Automation of Predictive Flood Data and Map Production

Ian Hand, GIS Specialist

IRLOGI QGIS Workshop - 07/06/2017
National Flood Risk Management Data Management Section

Section established as a result of large volumes of spatial data required for the following:

- National Flood Management Policy
- EU Floods Directive
- EU INSPIRE Directive
- Public Service Reform Plan 2014-2016

It’s purpose is to provide systems, processes and infrastructure to generate, manage, store and publish flood hazard and risk data.
Geoprocessing and Map Production

- Generating flood depths and flood extents via geoalgorithm model building: Graphical Modeler

- Production of Flood Hazard and Risk maps: Atlas Composer
Flood Depth and Flood Extent Generation: QGIS Graphical Modeler

• Flood Depth inputs consist of nodes (.csv files) produced by flood modelling team for 10yr, 100yr, 200yr (coastal only) and 1000yr flood event scenarios

• Flood extents generated from flood depths

• Producing both flood depths and extents manually a lengthy process with multiple outputs before final products

• QGIS Graphical Modeler automates process, producing final products with no additional outputs
1) Predictive Flood Depths and Extents Model

Nodes Input
- Points layer from table

Processing Extent
- Inverse distance weighted

LIDAR Input
- Raster calculator
  - Clip raster by mask layer

GN26 attributes file
- Join attributes table
  - Delete DN column
  - Delete FID column

OUTPUT FLOOD DEPTH R...

OUTPUT FLOOD EXTENT V...
Flood Depths and Extents from CSV Model
Modeler Inputs

1. Nodes Input
   - Nodes contain data on predictive water level for future flood event scenarios

2. Processing Extent
   - Extent to determine interpolation of nodes data

3. LiDAR Input
   - Current LiDAR data

4. GN26 attributes file
   - csv file containing attribute fields
Modeler Algorithms
Modeler Algorithms Explained

1. Nodes input converted from csv to points

2. Virtual points interpolated to continuous raster

3. LiDAR input subtracted from interpolated raster surface

4. Data above zero depth given a value of 1
5. Boolean raster data polygonised

6. All values of 1 selected

7. Saves selection of “1” values

8. Assigning of unique IDs for joining attributes input
9. Joining of attributes file and polygon layer

10. DN field not needed for output

11. Unique ID field created previously not needed for output
   *Final Flood Extent Output*

12. Clips raster from raster calculator
   *Final Flood Depth Output*
Modeler Output

INPUT

FLOOD DEPTH

FLOOD EXTENT
2) Areas To Be Excluded from Flood Depth Model
Areas To Be Excluded from Flood Depth Model

![Flood Depth Areas To Be Excluded](image)
Areas To Be Excluded from Flood Depth
Generating Flood Hazard and Risk Maps: Atlas Composer

• Outputs from the Graphical Modelers now need to be mapped:
  - Flood Extent Maps (10, 100, 200 [coastal only], 1000 yr)
  - Flood Depth Maps (10, 100, 200 [coastal only], 1000 yr)

• Large volumes of maps need to be produced, numerous datasets and styling required.
1) Datasets grouped into map types
2) Styling applied to data
3) OSI rasters merged into single virtual raster catalog
4) Print Composer Template loaded for type of flood map
4) Atlas parameters inputted

CASE WHEN $id = $atlasfeatureid THEN “B” END || CASE WHEN $id = $atlasfeatureid THEN “UoM” END || ‘_EXFCD_F1_’ || CASE WHEN $id = $atlasfeatureid THEN “Dwg_no” END

e.g. “O16CLN_EXFCD_F1_02”
5.) Template populated with data, allowing for final Atlas generation
Conclusions

• **Benefits of using QGIS Graphical Modeler:**
  - Eliminates the need to manually process each step which would result in multiple outputs before final products
  - The option to utilise the power of multiple algorithm providers (GRASS, SAGA, GDAL, etc.)
  - Can be ran as a batch process for large volumes of data

• **Benefits of using QGIS Atlas Composer:**
  - Data driven components minimise human error when producing large volumes of maps
  - Time efficient process in comparison to manual sheet by sheet map production
Acknowledgements & Useful Links...

QGIS Project
http://www.qgis.org/

Office of Public Works
http://maps.opw.ie/