

An Introduction to GIS Fundamentals

PART 5. VECTOR TOOLS



Vector Tools

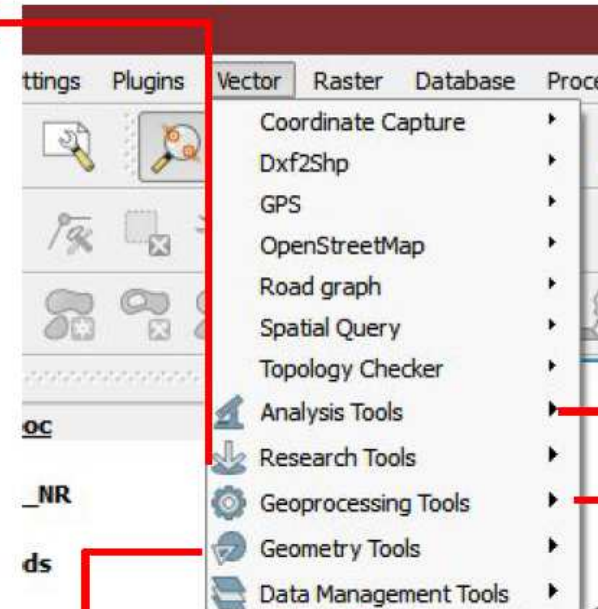
Research

Analysis

- Random selection
- Random selection within subsets
- Random points
- Regular points
- Vector grid
- Select by location
- Polygon from layer extent

Geometry

- Check geometry validity
- Export/Add geometry columns
- Polygon centroids
- Delaunay triangulation
- Voronoi Polygons
- Simplify geometries
- Densify geometries
- Multipart to singleparts
- Singleparts to multipart
- Polygons to lines
- Lines to polygons
- Extract nodes



- Distance matrix
- Sum line lengths
- Points in polygon
- List unique values
- Basic statistics
- Nearest neighbour analysis
- Mean coordinate(s)
- Line intersections

- Convex hull(s)
- Buffer(s)
- Intersect
- Union
- Symmetrical difference
- Clip
- Difference
- Dissolve
- Eliminate sliver polygons

- Define current projection
- Join attributes by location
- Split vector layer
- Merge shapefiles to one
- Create spatial index

Geoprocessing Data management

Vector Tools Geometry

- Centroids
- Collect geometries
- Extract vertices
- Multipart to singleparts
- Simplify
- Check validity
- Delaunay triangulation
- Densify by count
- Export geometry columns**
- Lines to polygons
- Polygons to lines
- Voronoi polygons



Add geometry to features creating a new temporary file «Added geom info»:
Coordinates to points, Length to lines, Area and perimeter to polygons

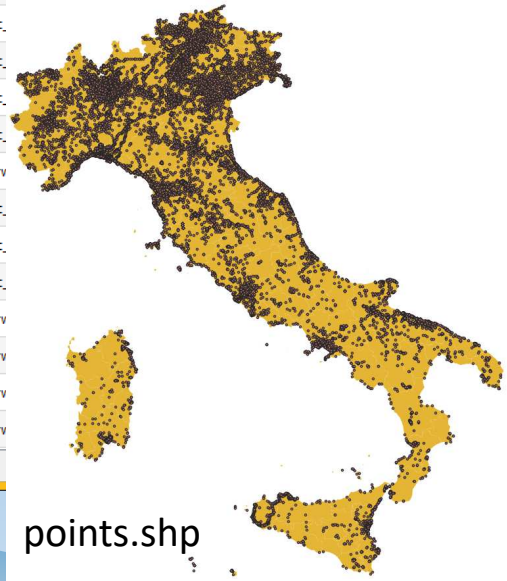
points :: Features Total: 47427, Filtered: 0

	osm_id	name	type
1	172072	Novara	motorway_junctio
2	879368		traffic_signals
3	918437		traffic_signals
4	1313296		level_crossing
5	1433338		traffic,
6	1954347		traffic,
7	1954350		traffic,
8	2086477		traffic,
9	2119890	Firenze Certosa	motorv
10	4062382		traffic,
11	4062431		traffic,
12	4062438		traffic,
13	4065099	Prato Ovest	motorv
14	4065729	Chiesina Uzzanese	motorv
15	4065758	Capannori	motorv
16	4066278	Lucca Ovest	motorv

Show All Features

Added geom info :: Features Total: 47427, Filtered: 47427, Selected: 0

	osm_id	name	type	xcoord	ycoord
1	172072	Novara	motorway_junctio	8.67394	45.46838
2	879368		traffic_signals	11.28191	43.76584
3	918437		traffic_signals	11.11487	43.87601
			level_crossing	11.09953	43.87196
			level_crossing	11.09840	43.87048
			traffic_signals	11.18014	43.80954
		Certosa	motorway_junctio	11.22080	43.72418
			traffic_signals	11.09752	43.89326
			traffic_signals	11.09545	43.89016
			traffic_signals	11.08825	43.88083
		vest	motorway_junctio	11.02895	43.88290
		a Uzzanese	motorway_junctio	10.71879	43.84237
		ori	motorway_junctio	10.59875	43.82250
		vest	motorway_junctio	10.46749	43.83715



Save file as points_xy.shp

Training event (C1) of Daylighting rivers Florence Oct. 1st – 5th 2018

Vector Tools Geometry

- Centroids
- Collect geometries
- Extract vertices
- Multipart to singleparts
- Simplify
- Check validity
- Delaunay triangulation
- Densify by count
- Export geometry columns**
- Lines to polygons
- Polygons to lines
- Voronoi polygons



Add geometry to features creating a new temporary file «Added geom info»:
Coordinates to points, **Lenght to lines**, Area and perimeter to polygons

reticolo_idrografico :: Features Total: 61630, Filtered: 61630, Selected: 0

ID_FIUME	ID_TRATTA	TIPO	NOME	FOGLIO_IGM	SOTTOTIPO	ORDINE	BACINO_PRI	BACINO	DA	TIPO_DA	A	TIPO_A
8785	35322	33268		FIRENZE	1	3	ARNO		SORGENTE	1	33267	3
8786	35326	33312		FIRENZE	1	3	ARNO		SORGENTE	1	LA CHIASSA	3
8787	35364	33316	TORRENTE	CASTRO	FIRENZE	1	3	ARNO		SORGENTE	1	33317
87					1	2	ARNO		SORGENTE	1	33312	3
87					1	5	ARNO		SORGENTE	1	29991	3
87					1	4	ARNO		SORGENTE	1	CASTRO	3
87					1	4	ARNO		SORGENTE	1	33324	3
87					1	3	ARNO		SORGENTE	1	CORSALONE	3
87					1	4	ARNO		SORGENTE	1	33234	3

River network

Reticolo idrografico.shp

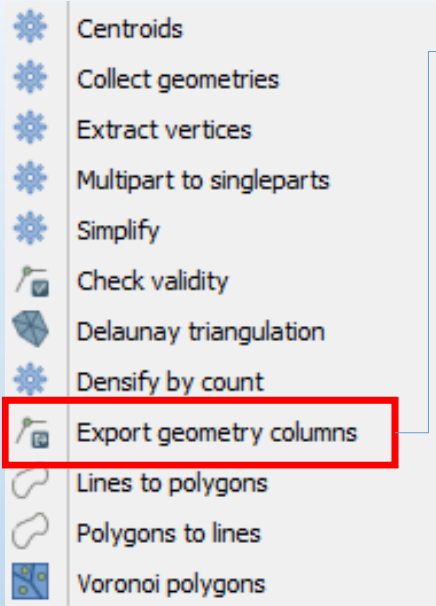
Added geom info :: Features Total: 61630, Filtered: 61630, Selected: 0

ID_FIUME	ID_TRATTA	TIPO	NOME	length
150028	1		DELLA RHO	2240.81163
150028	1		DELLA RHO	2055.21855
150028	1		DI VALLE S	1325.50702
150028	1		DI VALLE S	2466.72922
150028	1		DI VALLE S	1484.17642
150028	1		DI VALLE S	1501.50214
150028	1		DI VALLE S	1643.76224

Geometry

Training event (C1) of Daylighting rivers Florence Oct. 1st – 5th 2018

Vector Tools Geometry



Add geometry to features creating a new temporary file «Added geom info»:
Coordinates to points, Length to lines, **Area and perimeter to polygons**

Bacini_idrografici_principali_0607 :: Features Total: 137, Filtered: 137, Selected: 0

	DGC_CODICE	ID_BACINO	NOME_BAC	NOME CORSO	FOGLIO_IGM	ORDINE	CODIFICA	AUTORITA
10	34.000000000000	0	ARGENTINA	FIUMARA DI TAGGIA	CUNEO	1		ARPA LIGURIA
11	6.000000000000	0	ARNO	FIUME ARNO	FIRENZE	1		REGIONE TOSCANA
12	5.000000000000	0	ARRONE	FIUME ARNONE	ROMA	1		EX COMPARTIME...
13	80.000000000000	0	ASO	FIUME ASO	PERUGIA	1		ADB MARCHE
				FIUME PESCARA	PESCARA	1		REGIONE ABRUZZO
				CORSI D'ACQUA LAGUNA VENETA	VENEZIA	1		ADB VENETO
				RIU BARCA	SASSARI	1		REGIONE SARDEGNA
				FIUME BASENTO	TARANTO	1		ADB BASILICATA

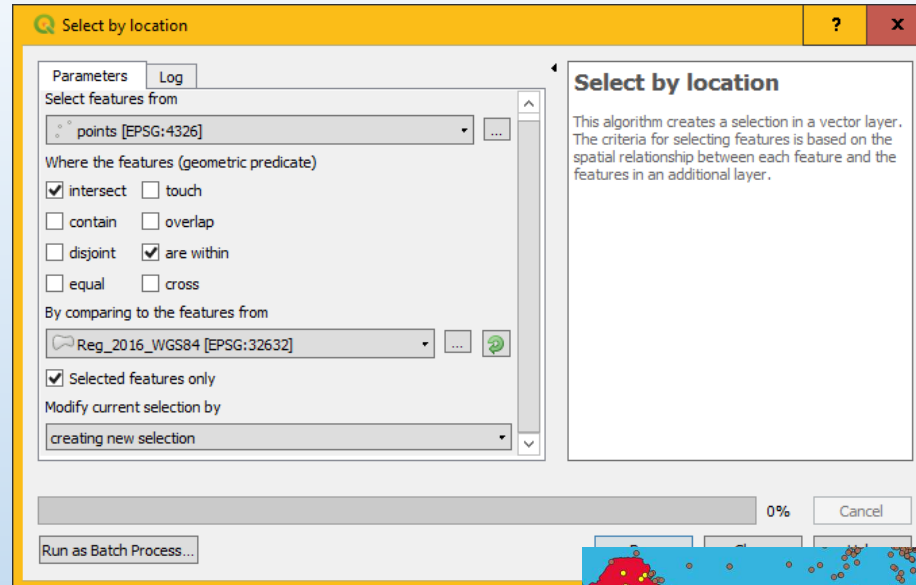
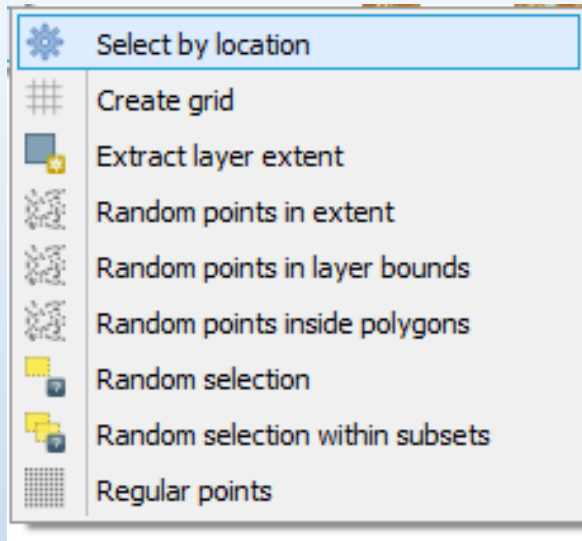


Selected: 0

	NOME CORSO	FOGLIO_IGM	ORDINE	CODIFICA	AUTORITA	area	perimeter
	FIUMARA DI TAGGIA	CUNEO	1		ARPA LIGURIA	208571739.55457	79708.83537
	FIUME ARNO	FIRENZE	1		REGIONE TOSCANA	851843.34401	72933.6818
	FIUME ARNONE	ROMA	1		EX COMPARTIME...	310817757.73535	130552.33473
	FIUME ASO	PERUGIA	1		ADB MARCHE	281620139.59399	154528.95320
	FIUME PESCARA	PESCARA	1		REGIONE ABRUZZO	3181104033.615...	390122.14370
	CORSI D'ACQUA LAGUNA VENETA	VENEZIA	1		ADB VENETO	1459979542.817...	362616.67223
	RIU BARCA	SASSARI	1		REGIONE SARDEGNA	353456744.44043	128902.09452
	FIUME BASENTO	TARANTO	1		ADB BASILICATA	1524232274.359...	310544.35554
	FIUME BELICE	ALCAMO	1		REGIONE SICILIA	958292570.55078	188132.75715
	FIUME BIFERNO	FOGGIA	1		COMP. IDROGRA...	1323080653.486...	246269.40736

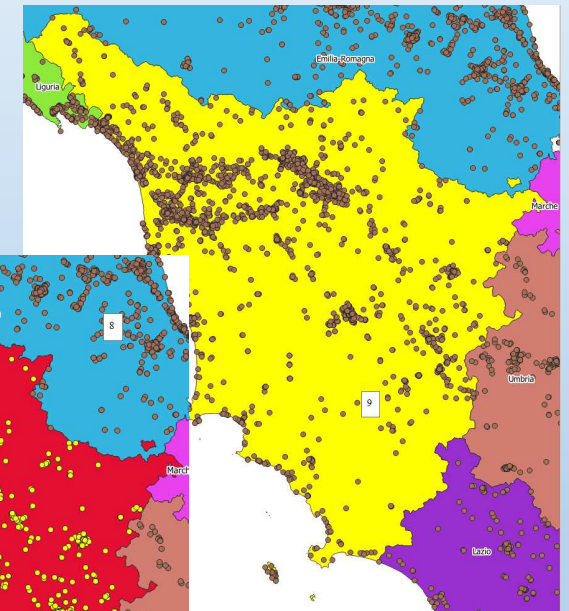
Geometry

Vector Tools **Research: Select by Location**



Select «Toscana» from
Reg_2016_WGS84.shp

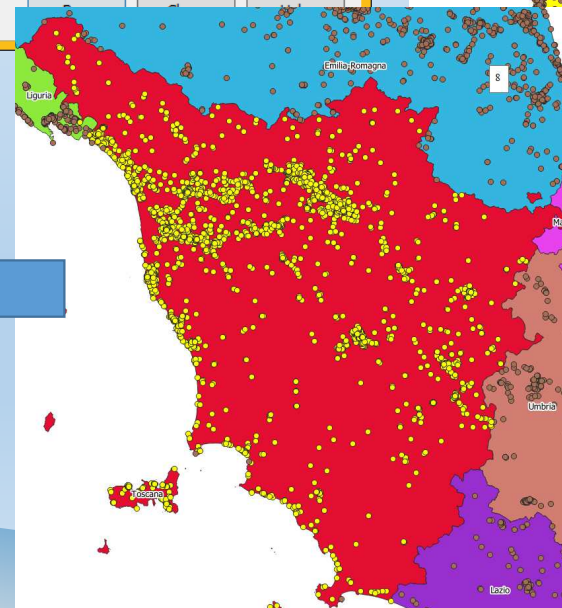
Extract the points from points.shp
within the region



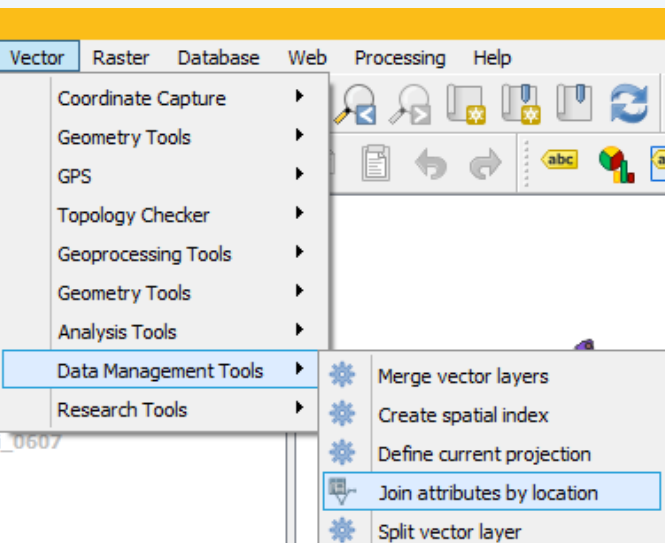
points :: Features Total: 47427, Filtered: 47427, ...

	osm_id	name	type
85	26859711	Poggetto	camp_site
86	26859725	Puntala	camp_site
87	26859729	Rada Etrusca	camp_site
88	26859737	Rifugio del Mare	camp_site
89	26859764	Rosmarina	camp_site
90	26859796	Semifonte	camp_site
91	26859810	Soline	camp_site
92	26859824	Stellamare	camp_site
93	26859831	Talamone	camp_site
94	26859833	Tamerici	camp_site
95	26859834	Tavarnelle	camp_site

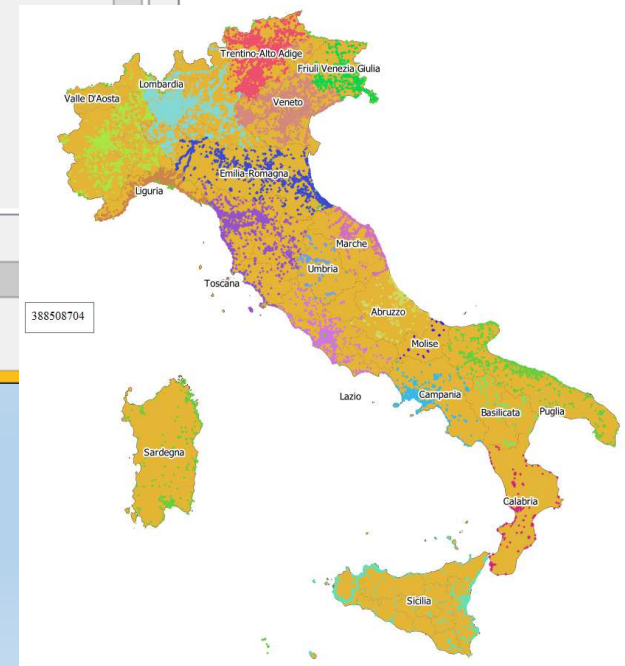
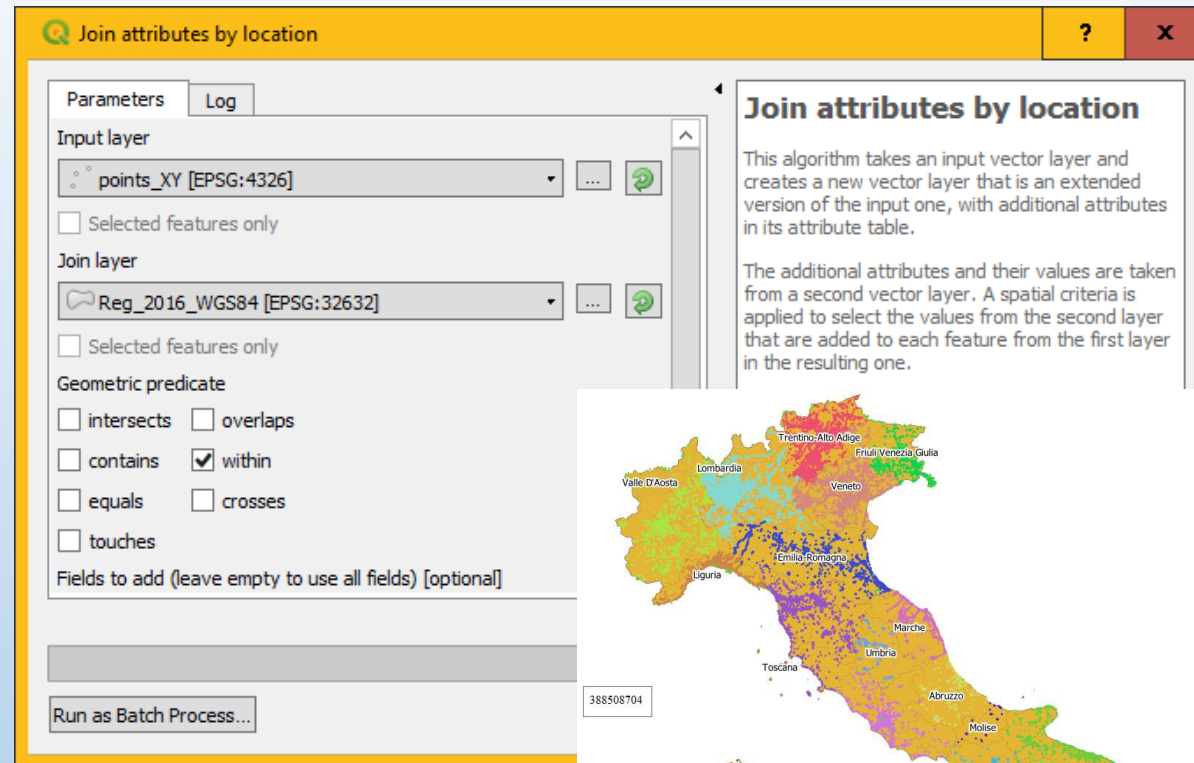
Show All Features



Vector Tools Data Management : Join by location



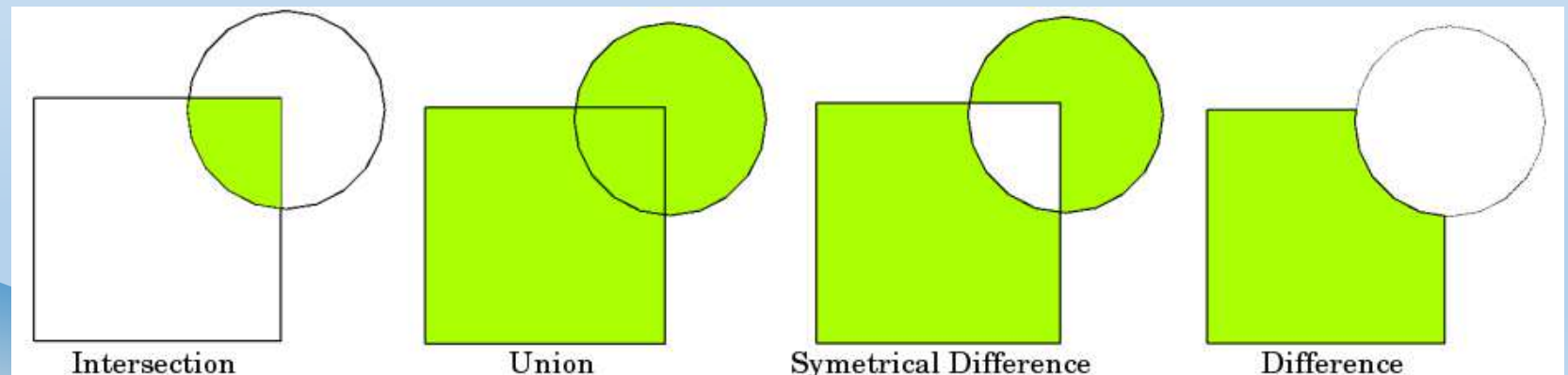
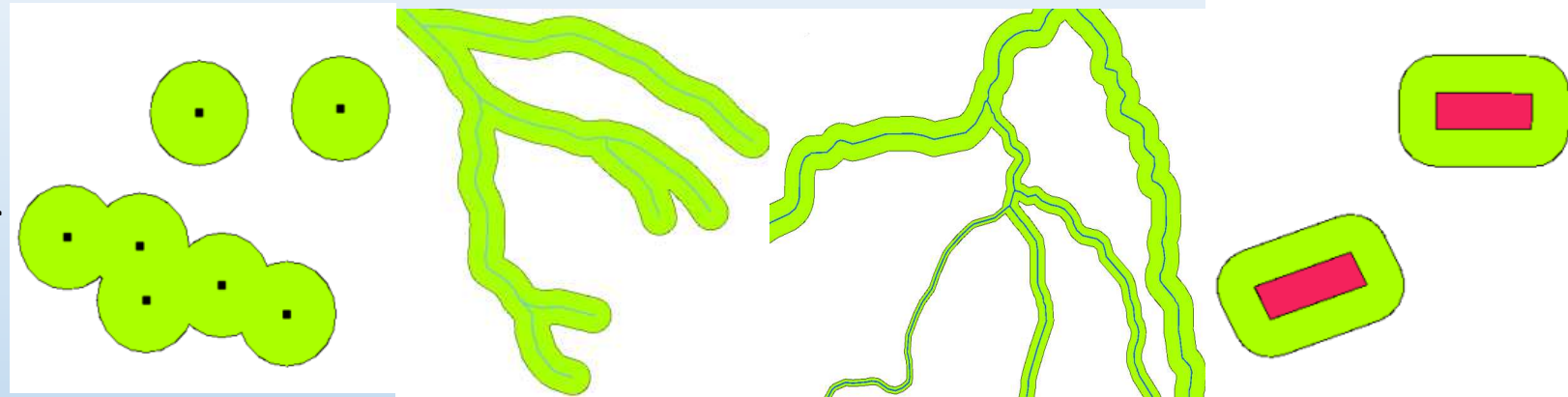
- ☐ Add the attribute from Reg_2016_WHG84 to points_xy.shp
- ☐ Save the joined layer as points_xy_Reg.shp
- ☐ Classify the points in term of the region the fall in.



Vector Tools **Geoprocessing**

You can use Geoprocessing Tools to perform spatial operations. As a standard feature, Qgis is equipped with the following geoprocessing tools:

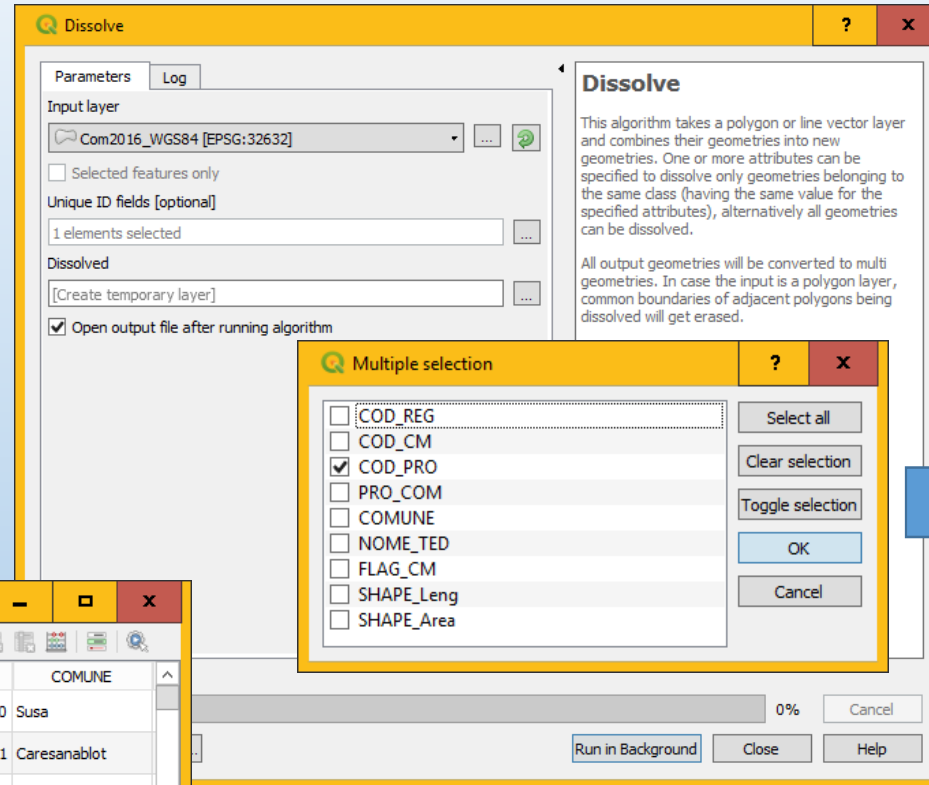
- ☐ Intersection
- ☐ Symmetrical Difference
- ☐ Fixed Distance Buffer
- ☐ Variable Distance buffer
- ☐ Union
- ☐ Dissolve
- ☐ Difference
- ☐ Clip



Vector Tools Geoprocessing - Dissolve

Load the layer «Com2016_WGS84»

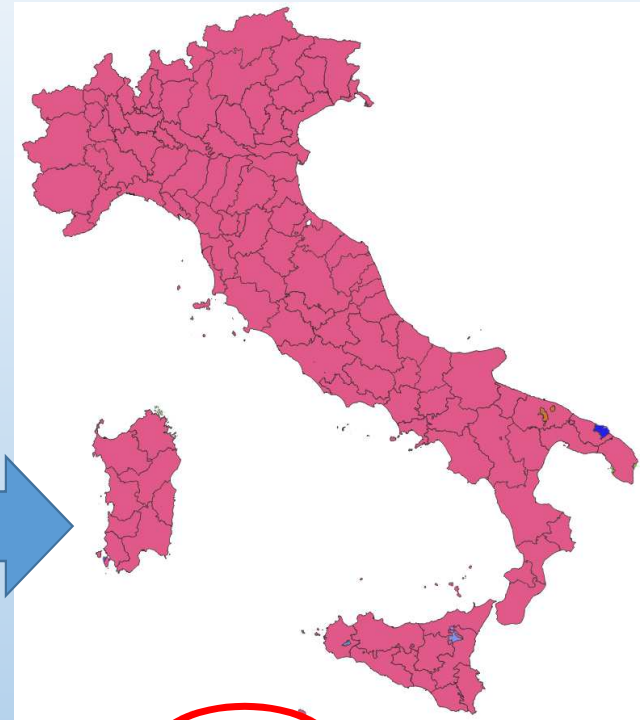
Classify by category the field COD_PRO



Com2016_WGS84: Features Total: 7998, Filtered: 7998, Selected: 0

	COD_REG	COD_CM	COD_PRO	PRO_COM	COMUNE
1	1	201	1	1270	Susa
2		0	2	2031	Caresanablot
3	1	201	1	1286	Vallo Torinese
4	1	201	1	1310	Virle Piemonte
5	1	201	1	1277	Trausella

Show All Features



Dissolve: Features Total: 110, Filtered: 110, Selected: 0

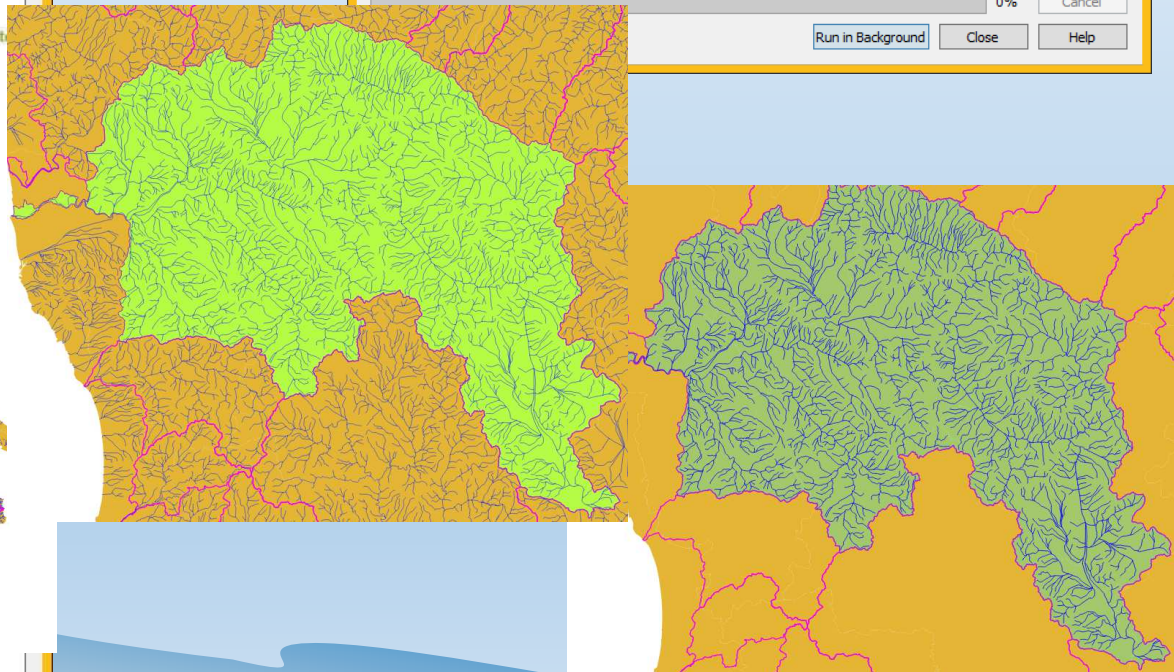
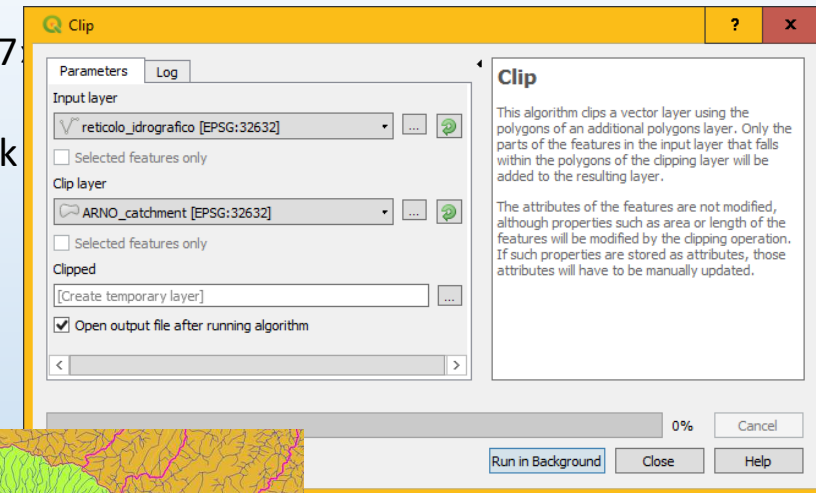
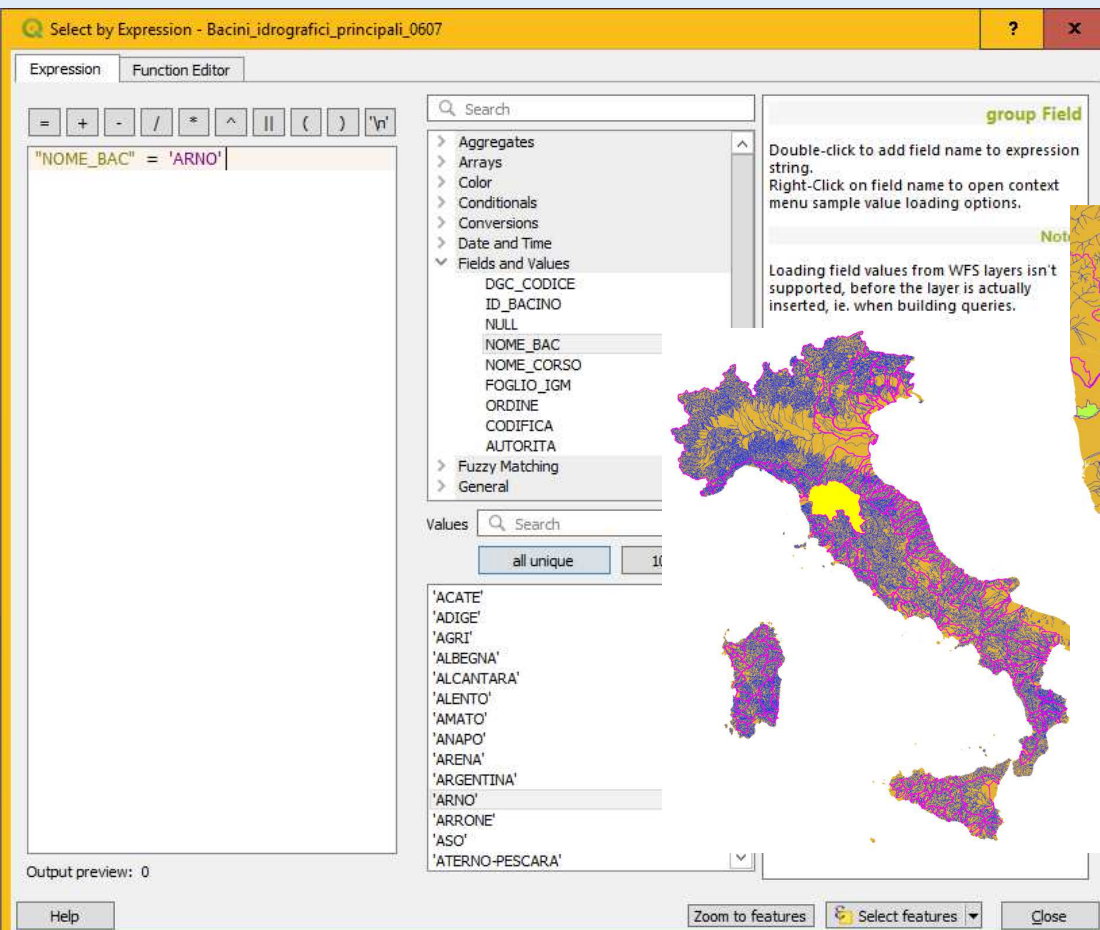
	COD_REG	COD_CM	COD_PRO	PRO_COM	COMUNE
1	18	0	101	101022	Santa Severina
2	18	0	102	102009	Drapia
3	19	0	87	87035	Piedimonte Etneo
4	19	0	88	88004	Giarratana
5	19	0	89	89012	Melli

Show All Features

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Vector Tools Geoprocessing - Clip

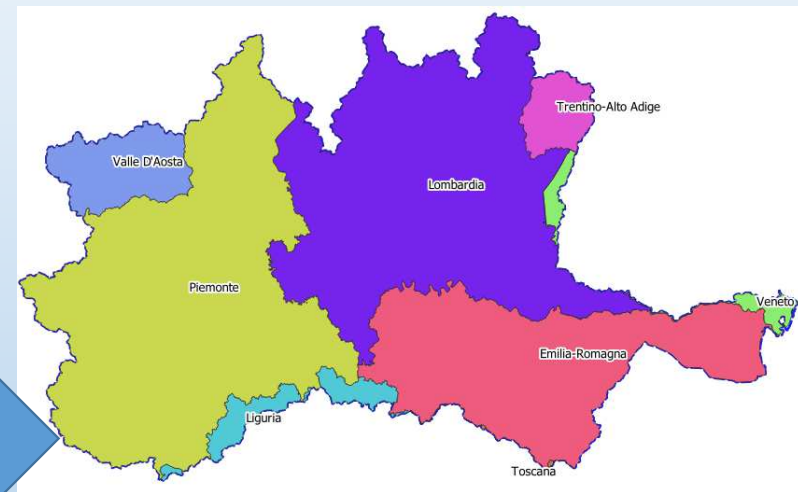
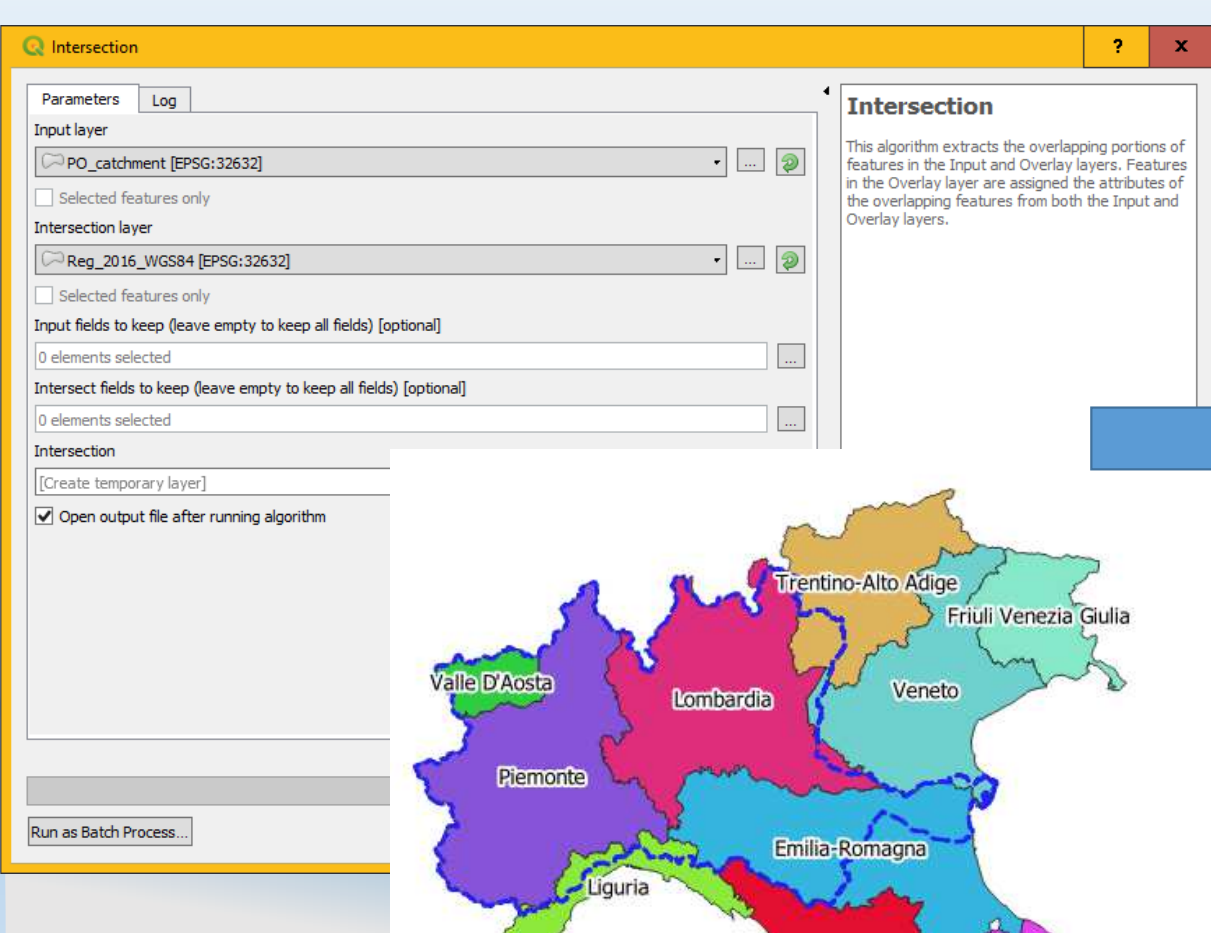
Load the layer «reticolo_idrografico.shp» and «Bacini_idrografici_principali_0607»
 Select the ARNO catchment from «Bacini_idrografici_principali_0607»
 Save the selection to a new layer as ARNO.shp and use it to clip the river network



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Vector Tools Geoprocessing - Intersect

Select the PO catchment from «Bacini_idrografici_principali_0607»
 Save the selection to a new layer as PO.shp and intersect it with the layer «Region_2016_WGS84»
 Calculate the area share of each region within the catchment (need to calculate the area first!)



Added geom info :: Features Total: 8, Filtered: 8, Selected: 0

TOWN	Pop_Region	Pop_Popula	area	perimeter	Sup_Km2	aREA tot	REG_sSHARE
1	Toscana	3742437	20039595,16846	185070,66513	20,040	69804.019	0,029
2	Veneto	4907529	849954037,38184	529113,90708	849,954	69804.019	1,218
3	Liguria	1565307	1589433465,466...	560081,86272	1589,433	69804.019	2,277
4	Trentino-Alto Adige	1062860	1667485324,397...	275543,58992	1667,485	69804.019	2,389
5	Valle d'Aosta	126883	3250431776,433...	318859,11036	3250,432	69804.019	4,657
6	Emilia-Romagna	4448841	13928097478,55...	965843,76238	13928,097	69804.019	19,953
7	Lombardia	10018806	23165001983,70...	1428507,21136	23165,002	69804.019	33,186
8	Piemonte	4392526	25333576296,25...	1305586,70941	25333,576	69804.019	36,292

Show All Features

Vector Tools Geoprocessing - Buffer

Q Buffer

?

X

Parameters Log

Input layer

V reticolo_ARNO [EPSG:32632]

...

☐ Selected features only

Distance

50,000000

X

^

v

meters

Segments

5

^

v

End cap style

Round

v

Join style

Round

v

Miter limit

2,000000

^

v

☐ Dissolve result

Buffered

[Create temporary layer]

...

☒ Open output file after running algorithm

Buffer

This algorithm computes a buffer area for all the features in an input layer, using a fixed or dynamic distance.

The segments parameter controls the number of line segments to use to approximate a quarter circle when creating rounded offsets.

The end cap style parameter controls how line endings are handled in the buffer.

The join style parameter specifies whether round, miter or beveled joins should be used when offsetting corners in a line.

The miter limit parameter is only applicable for miter join styles, and controls the maximum distance from the offset curve to use when creating a mitered join.

0%

Cancel

Run as Batch Process...

Run in Background

Close

Help



Vector Tools Geoprocessing - Buffer

