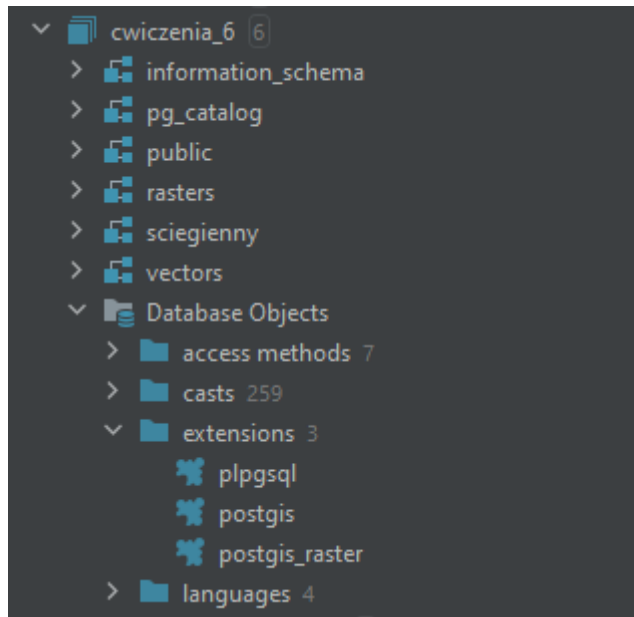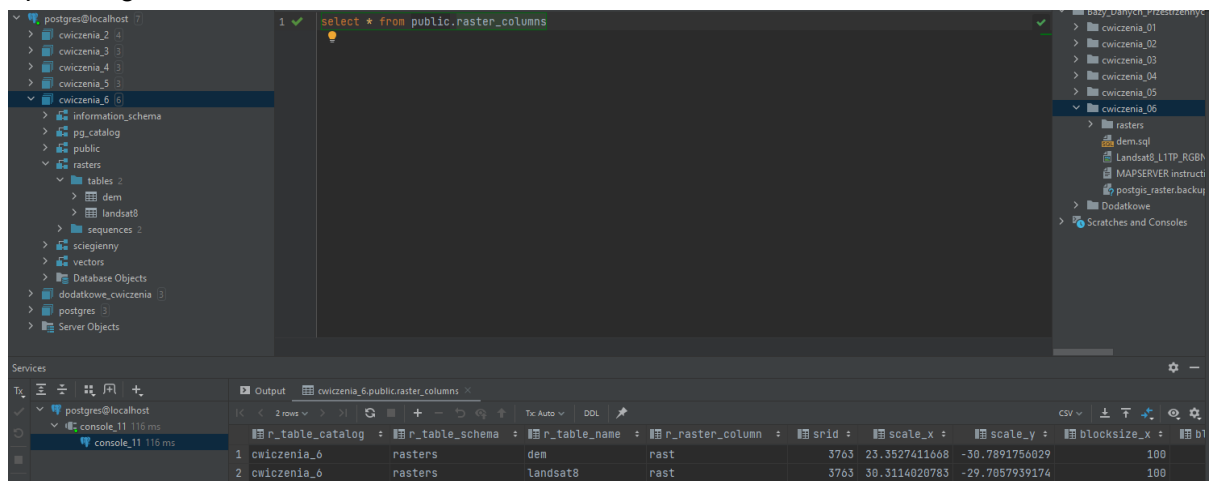## Baza Danych
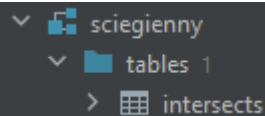

Uploading raster

Przykład 1

```
cwiczenia_6.public> CREATE TABLE sciegienny.intersects AS
                    SELECT a.rast, b.municipality
                    FROM rasters.dem AS a, vectors.porto_parishes AS b
                    WHERE ST_Intersects(a.rast, b.geom) AND b.municipality ilike 'porto'
[2022-11-23 23:28:49] 25 rows affected in 15 ms
```

```
∨  sciegienny
  ∨  tables 1
    >  ⊞ intersects
```

```
cwiczenia_6.public> alter table sciegienny.intersects
                    add column rid SERIAL PRIMARY KEY
[2022-11-23 23:30:17] completed in 11 ms
```

```
cwiczenia_6.public> CREATE INDEX idx_intersects_rast_gist ON sciegienny.intersects
                    USING gist (ST_ConvexHull(rast))
[2022-11-23 23:30:43] completed in 2 ms
```

```
cwiczenia_6.public> SELECT AddRasterConstraints('sciegienny'::name,
                    'intersects'::name,'rast'::name)
Adding SRID constraint
Adding scale-X constraint
Adding scale-Y constraint
Adding blocksize-X constraint
Adding blocksize-Y constraint
Adding alignment constraint
Adding number of bands constraint
Adding pixel type constraint
Adding nodata value constraint
Adding out-of-database constraint
Adding maximum extent constraint
[2022-11-23 23:33:44] 1 row retrieved starting from 1 in 42 ms (execution: 23 ms, fetching: 19 ms)
```

Przykład 2

```
cwiczenia_ó.public> CREATE TABLE sciegienny.clip AS
                    SELECT ST_Clip(a.rast, b.geom, true), b.municipality
                    FROM rasters.dem AS a,
                         vectors.porto_parishes AS b
                    WHERE ST_Intersects(a.rast, b.geom)
                      AND b.municipality like 'PORTO'
[2022-11-23 23:34:58] 25 rows affected in 22 ms
```

Przykład 3

```
cwiczenia_ó.public> CREATE TABLE sciegienny.union AS
                    SELECT ST_Union(ST_Clip(a.rast, b.geom, true))
                    FROM rasters.dem AS a, vectors.porto_parishes AS b
                    WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom,a.rast)
[2022-11-23 23:35:44] 1 row affected in 31 ms
```

RASTROWANIE
Przykład 1

```
cwiczenia_ó.public> CREATE TABLE sciegienny.porto_parishes AS
                    WITH r AS (
                    SELECT rast FROM rasters.dem
                    LIMIT 1
                    )
                    SELECT ST_AsRaster(a.geom,r.rast,'8BUI',a.id,-32767) AS rast
                    FROM vectors.porto_parishes AS a, r
                    WHERE a.municipality ilike 'porto'
[2022-11-23 23:37:01] 7 rows affected in 21 ms
```

Przykład 2


```
cwiczenia_6.public> DROP TABLE sciegienny.porto_parishes
[2022-11-23 23:38:45] completed in 3 ms
cwiczenia_6.public> CREATE TABLE sciegienny.porto_parishes AS
                    WITH r AS (
                    SELECT rast FROM rasters.dem
                    LIMIT 1
                    )
                    SELECT st_union(ST_AsRaster(a.geom,r.rast,'8BUI',a.id,-32767)) AS rast
                    FROM vectors.porto_parishes AS a, r
                    WHERE a.municipality ilike 'porto'
[2022-11-23 23:38:49] 1 row affected in 22 ms
```

Przykład 3

```
cwiczenia_6.public> CREATE TABLE sciegienny.porto_parishes AS
                    WITH r AS (
                    SELECT rast FROM rasters.dem
                    LIMIT 1 )
                    SELECT st_tile(st_union(ST_AsRaster(a.geom,r.rast,'8BUI',a.id,-
                    32767)),128,128,true,-32767) AS rast
                    FROM vectors.porto_parishes AS a, r
                    WHERE a.municipality ilike 'porto'
[2022-11-23 23:44:01] 8 rows affected in 22 ms
```

WEKTORYZOWANIE
Przykład 1

```
cwiczenia_ó.public> create table sciegienny.intersection as
                    SELECT
                    a.rid,(ST_Intersection(b.geom,a.rast)).geom,(ST_Intersection(b.geom,a.rast)
                    ).val
                    FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
                    WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom,a.rast)
[2022-11-23 23:49:06] 6,649 rows affected in 1 s 478 ms
```

Przykład 2

```
cwiczenia_ó.public> CREATE TABLE sciegienny.dumppolygons AS
                    SELECT
                    a.rid,(ST_DumpAsPolygons(ST_Clip(a.rast,b.geom))).geom,(ST_DumpAsPolygons(
                        ST_Clip(a.rast,b.geom))).val
                    FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
                    WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom,a.rast)
[2022-11-23 23:49:51] 6,442 rows affected in 35 ms
```

ANALIZA RASTRÓW
Przykład 1

```
cwiczenia_ó> CREATE TABLE sciegienny.landsat_nir AS
             SELECT rid, ST_Band(rast,4) AS rast
             FROM rasters.landsat8
[2022-11-24 11:22:25] 630 rows affected in 380 ms
```

Przykład 2

```
cwiczenia_ó.public> CREATE TABLE sciegienny.paranhos_dem AS
                    SELECT a.rid,ST_Clip(a.rast, b.geom,true) as rast
                    FROM rasters.dem AS a, vectors.porto_parishes AS b
                    WHERE b.parish ilike 'paranhos' and ST_Intersects(b.geom,a.rast)
[2022-11-24 11:23:37] 4 rows affected in 36 ms
```

Przykład 3

```
cwiczenia_ó.public> CREATE TABLE sciegienny.paranhos_slope AS
                    SELECT a.rid,ST_Slope(a.rast,1,'32BF','PERCENTAGE') as rast
                    FROM sciegienny.paranhos_dem AS a
[2022-11-24 11:24:45] 4 rows affected in 85 ms
```

Przykład 4

```
cwiczenia_6.public> CREATE TABLE sciegienny.paranhos_slope_reclass AS
                    SELECT a.rid,ST_Reclass(a.rast,1,']0-15]:1, (15-30]:2, (30-9999:3',
                    '32BF',0)
                    FROM sciegienny.paranhos_slope AS a
[2022-11-24 11:25:35] 4 rows affected in 5 ms
```

Przykład 5

	stats
1	(2616,278385,106.41628440366972,11.622628762211638,87,143)
2	(6463,816615,126.35231316725978,14.0438229209133,94,158)
3	(682,95581,140.14809384164224,12.078072186605759,103,158)
4	(216,31874,147.5648148148148,4.262830628315728,137,158)

Przykład 6

	st_summarystats
1	(9977,1222455,122.52731281948482,16.908004202736272,87,158)

Przykład 7

	min	max	mean
1	87	158	122.52731281948482

Przykład 8

	parish	min	max	mean
1	Bonfim	1	159	107.5658842667906
2	Campanhã	0	178	74.66732213085449
3	Paranhos	87	158	122.52731281948482
4	Ramalde	48	108	77.58444444444444
5	União das freguesias de Aldoar, Foz do Douro e Nevogilde	-4	83	34.66735489791237
6	União das freguesias de Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau e Vitória	1	157	95.00277741039545
7	União das freguesias de Lordelo do Ouro e Massarelos	-1	117	49.50051440329218

Przykład 9

name	st_value
1	Aldeia São Miguel	96
2	Alpendurada e Matos	145
3	Amarante	71
4	Baião	581
5	Cabeceiras de Basto	<null>
6	Castelo de Paiva	284
7	Celorico de Basto	227
8	Cinfães	405
9	Espinho	14
10	Fafe	338
11	Fajozes	53
12	Felgueiras	320
13	Gondomar	123
14	Guifões	69
15	Guimarães	197
16	Lousada	289
17	Maia	111
18	Marco de Canaveses	193
19	Matosinhos	29

Przykład 10

```
cwiczenia_ó.public> create table sciegienny.tpi30 as
                    select ST_TPI(a.rast,1) as rast
                    from rasters.dem a
[2022-11-24 11:32:39] 589 rows affected in 19 s 464 ms
cwiczenia_ó.public> CREATE INDEX idx_tpi30_rast_gist ON sciegienny.tpi30
                    USING gist (ST_ConvexHull(rast))
[2022-11-24 11:34:42] completed in 5 ms
cwiczenia_ó.public> SELECT AddRasterConstraints('sciegienny'::name,
                    'tpi30'::name,'rast'::name)
Adding SRID constraint
Adding scale-X constraint
Adding scale-Y constraint
Adding blocksize-X constraint
Adding blocksize-Y constraint
Adding alignment constraint
Adding number of bands constraint
Adding pixel type constraint
Adding nodata value constraint
Adding out-of-database constraint
Adding maximum extent constraint
[2022-11-24 11:34:56] 1 row retrieved starting from 1 in 147 ms (execution: 131 ms, fetching: 16 ms)
```

ALGEBRA MAP

Przykład 1

```
cwiczenia_6.public> CREATE TABLE sciegienny.porto_ndvi AS
                    WITH r AS (
                    SELECT a.rid,ST_Clip(a.rast, b.geom,true) AS rast
                    FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
                    WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom,a.rast)
                    )
                    SELECT
                    r.rid,ST_MapAlgebra(
                    r.rast, 1,
                    r.rast, 4,
                    '([rast2.val] - [rast1.val]) / ([rast2.val] +
                    [rast1.val])::float','32BF'
                    ) AS rast
                    FROM r
[2022-11-24 11:37:07] 29 rows affected in 111 ms
cwiczenia_6.public> CREATE INDEX idx_porto_ndvi_rast_gist ON sciegienny.porto_ndvi
                    USING gist (ST_ConvexHull(rast))
[2022-11-24 11:37:38] completed in 3 ms
cwiczenia_6.public> SELECT AddRasterConstraints('sciegienny'::name,
                    'porto_ndvi'::name,'rast'::name)
Adding SRID constraint
Adding scale-X constraint
Adding scale-Y constraint
Adding blocksize-X constraint
Adding blocksize-Y constraint
Adding alignment constraint
Adding number of bands constraint
Adding pixel type constraint
Adding nodata value constraint
Adding out-of-database constraint
Adding maximum extent constraint
[2022-11-24 11:38:03] 1 row retrieved starting from 1 in 29 ms (execution: 15 ms, fetching: 14 ms)
```

Przykład 2

```
cwiczenia_6.public> create or replace function sciegienny.ndvi(
                    value double precision [] [] [],
                    pos integer [][],
                    VARIADIC userargs text []
                    )
                    RETURNS double precision AS
                    $$
                    BEGIN
                    --RAISE NOTICE 'Pixel Value: %', value [1][1][1];-->For debug purposes
                    RETURN (value [2][1][1] - value [1][1][1])/(value [2][1][1]+value
                    [1][1][1]); --> NDVI calculation!
                    END;
                    $$
                    LANGUAGE 'plpgsql' IMMUTABLE COST 1000
[2022-11-24 11:39:37] completed in 1 ms
```

```
cwiczenia_ó.public> CREATE TABLE sciegienny.porto_ndvi2 AS
                    WITH r AS (
                    SELECT a.rid,ST_Clip(a.rast, b.geom,true) AS rast
                    FROM rasters.landsat8 AS a, vectors.porto_parishes AS b
                    WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom,a.rast)
                    )
                    SELECT
                    r.rid,ST_MapAlgebra(
                    r.rast, ARRAY[1,4],
                    'sciegienny.ndvi(double precision[],
                    integer[],text[])'::regprocedure, --> This is the function!
                    '32BF'::text
                    ) AS rast
                    FROM r
[2022-11-24 11:40:12] 29 rows affected in 94 ms
```

```
cwiczenia_ó.public> CREATE INDEX idx_porto_ndvi2_rast_gist ON sciegienny.porto_ndvi2
                    USING gist (ST_ConvexHull(rast))
[2022-11-24 11:40:37] completed in 2 ms
cwiczenia_ó.public> SELECT AddRasterConstraints('sciegienny'::name,
                    'porto_ndvi2'::name,'rast'::name)
Adding SRID constraint
Adding scale-X constraint
Adding scale-Y constraint
Adding blocksize-X constraint
Adding blocksize-Y constraint
Adding alignment constraint
Adding number of bands constraint
Adding pixel type constraint
Adding nodata value constraint
Adding out-of-database constraint
Adding maximum extent constraint
[2022-11-24 11:40:49] 1 row retrieved starting from 1 in 29 ms (execution: 14 ms, fetching: 15 ms)
```

EKSPORT DANYCH

Przykład 1

```
cwiczenia_ó.public> SELECT ST_AsTiff(ST_Union(rast))
                    FROM sciegienny.porto_ndvi
[2022-11-24 11:43:27] 1 row retrieved starting from 1 in 81 ms (execution: 45 ms, fetching: 36 ms)
```

Przykład 2

```
cwiczenia_ó.public> SELECT ST_AsGDALRaster(ST_Union(rast), 'GTiff', ARRAY['COMPRESS=DEFLATE',
                    'PREDICTOR=2', 'PZLEVEL=9'])
                    FROM sciegienny.porto_ndvi
[2022-11-24 11:43:56] 1 row retrieved starting from 1 in 48 ms (execution: 23 ms, fetching: 25 ms)
```

Przykład 3

```
cwiczenia_6.public> CREATE TABLE tmp_out AS
                    SELECT lo_from_bytea(0,
                     ST_AsGDALRaster(ST_Union(rast), 'GTiff', ARRAY['COMPRESS=DEFLATE',
                    'PREDICTOR=2', 'PZLEVEL=9'])
                     ) AS loid
                    FROM sciegienny.porto_ndvi
[2022-11-24 11:45:33] 1 row affected in 25 ms
```

```
cwiczenia_6.public> SELECT lo_export(loid, 'D:\Studia\Semestr_7\Bazy_Danych_Przestrzennych\cwiczenia_06\myraster.tiff')
                    -- where the user postgres have access. In windows a flash drive usualy works
                    -- fine.
                    FROM tmp_out
[2022-11-24 11:46:15] 1 row retrieved starting from 1 in 23 ms (execution: 2 ms, fetching: 21 ms)
cwiczenia_6.public> SELECT lo_unlink(loid)
                     FROM tmp_out
[2022-11-24 11:46:25] 1 row retrieved starting from 1 in 22 ms (execution: 3 ms, fetching: 19 ms)
```

Przykład 4