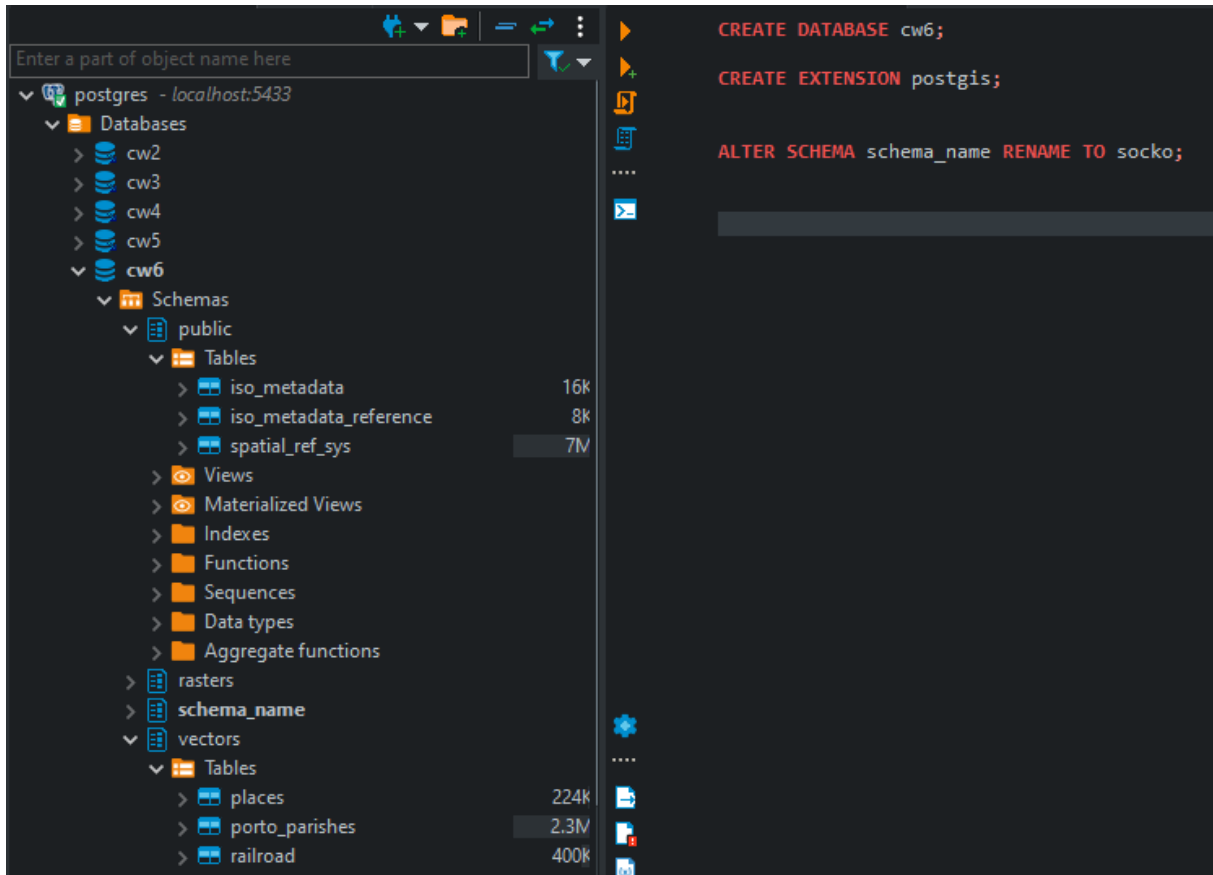


Ćwiczenia 6

Nowa baza danych

```
C:\Program Files\PostgreSQL\14\bin>pg_restore -U postgres -d cw6 -p 5433 C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\postgis_raster.backup
```



Ładowanie danych rastrowych

Przykład 1

```
C:\Program Files\PostgreSQL\14\bin>raster2pgsql.exe -s 3763 -N -32767 -t 100x100 -I -C -M -d C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\srtm_1arc_v3.tif rasters.dem > C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\dem.sql  
Processing 1/1: C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\srtm_1arc_v3.tif
```

Przykład 2

```
C:\Program Files\PostgreSQL\14\bin>raster2pgsql.exe -s 3763 -N -32767 -t 100x100 -I -C -M -d C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\srtm_1arc_v3.tif rasters.dem | psql -d cw6 -h localhost -U postgres -p 5433  
Processing 1/1: C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\srtm_1arc_v3.tif  
Password for user postgres:  
BEGIN  
NOTICE: table "dem" does not exist, skipping  
DROP TABLE  
CREATE TABLE  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1  
INSERT 0 1
```

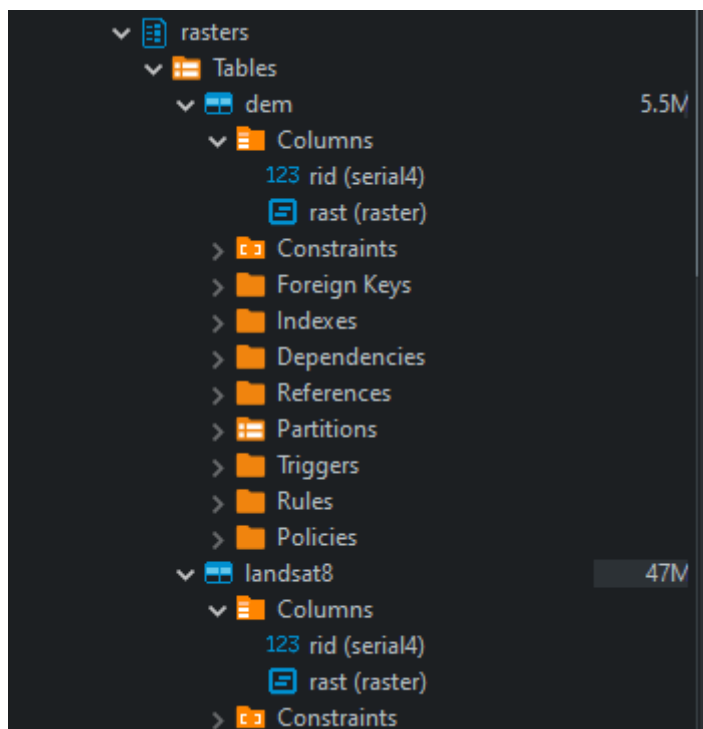
Przykład 3

```

C:\Program Files\PostgreSQL\14\bin>raster2pgsql.exe -s 3763 -N -32767 -t 128x128 -I -C -M -d C:\Users\Home\Desktop\7sem\
SpatialDatabases\spatial-databases\cwiczenia6\Landsat8_L1TP_RGBN.tif rasters.landsat8 | psql -d cw6 -h localhost -U post
gres -p 5433
Processing 1/1: C:\Users\Home\Desktop\7sem\SpatialDatabases\spatial-databases\cwiczenia6\Landsat8_L1TP_RGBN.tif
Password for user postgres:
BEGIN
NOTICE: table "landsat8" does not exist, skipping
DROP TABLE
CREATE TABLE
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1
INSERT 0 1

```

Sprawdzenie struktury rasters



Schemas

public

Tables

iso_metadata16K

iso_metadata_reference8K

spatial_ref_sys7M

Views

geography_columns

geometry_columns

raster_columns

raster_overviews

Materialized Views

Indexes

Functions

Sequences

Data types

Aggregate functions

rasters

socko

vectors

Tables

places224k

porto_parishes2.3M

railroad400K

Views

Materialized View

Name: raster_columns

Comment:

Object ID: 24577

Owner: postgres

Extra Options:

	Column Name	#	Data type	Identity	Collation	Not Null	Def
Columns							
Dependencies	r_table_catalog	1	name		C	[]	
	r_table_schema	2	name		C	[]	
Triggers	r_table_name	3	name		C	[]	
Rules	r_raster_column	4	name		C	[]	
Statistics	srid	5	int4			[]	
Permissions	scale_x	6	float8			[]	
Source	scale_y	7	float8			[]	
Virtual	blocksize_x	8	int4			[]	
	blocksize_y	9	int4			[]	
	same_alignment	10	bool			[]	
	regular_blocking	11	bool			[]	
	num_bands	12	int4			[]	
	pixel_types	13	_text		C	[]	
	nodata_values	14	_float8			[]	
	out_db	15	_bool			[]	
	extent	16	geometry			[]	
	spatial_index	17	bool			[]	

```
SELECT * FROM raster_columns;
```

raster_columns 1											
SELECT * FROM raster_columns											
	raster_catalog	raster_schema	raster_name	raster_column	sr_id	scale_x	scale_y	blocksize_x	blocksize_y	same_alignment	regular_blocking
1	rasters	dem	rast		3,763	23.3527411668	-30.7891756029	100	100	[v]	[]
2	rasters	landsat8	rast		3,763	30.3114020783	-29.7057939174	128	128	[v]	[]

Tworzenie rastrów z istniejących rastrów i interakcja z wektorami

Przykład 1 - ST_Intersects

```
--Przeciecie rastra z wektorem.
CREATE TABLE socko.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';

SELECT * FROM socko.intersects;

--1. dodanie serial primary key:
alter table socko.intersects
add column rid SERIAL PRIMARY KEY;

SELECT * FROM socko.intersects;

--2. utworzenie indeksu przestrzennego:
CREATE INDEX idx_intersects_rast_gist ON socko.intersects
USING gist (ST_ConvexHull(rast));

SELECT * FROM socko.intersects;

--3. dodanie raster constraints:

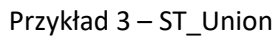
-- schema::name table_name::name raster_column::name
SELECT AddRasterConstraints('socko'::name,
'intersects'::name, 'rast'::name);
```

Output

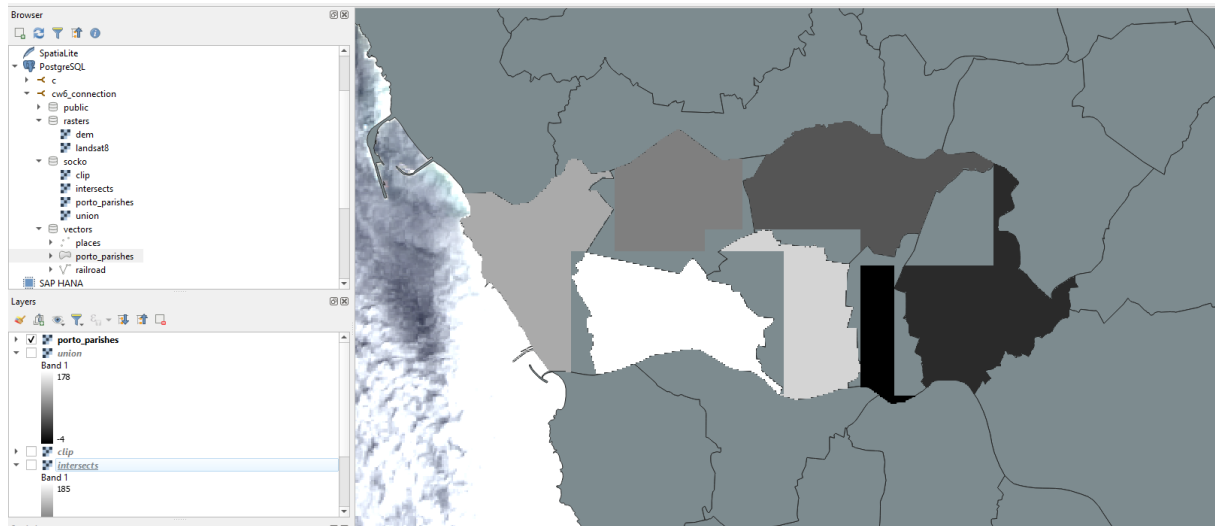
```
Adding SRID constraint
Adding scale-X constraint
Adding scale-Y constraint
Adding blocksize-X constraint
Adding blocksize-Y constraint
Adding alignment constraint
Adding number of bands constraint
Adding pixel type constraint
Adding nodata value constraint
Adding out-of-database constraint
Adding maximum extent constraint
Adding SRID constraint
```

addrasterconstraints
1 [v]

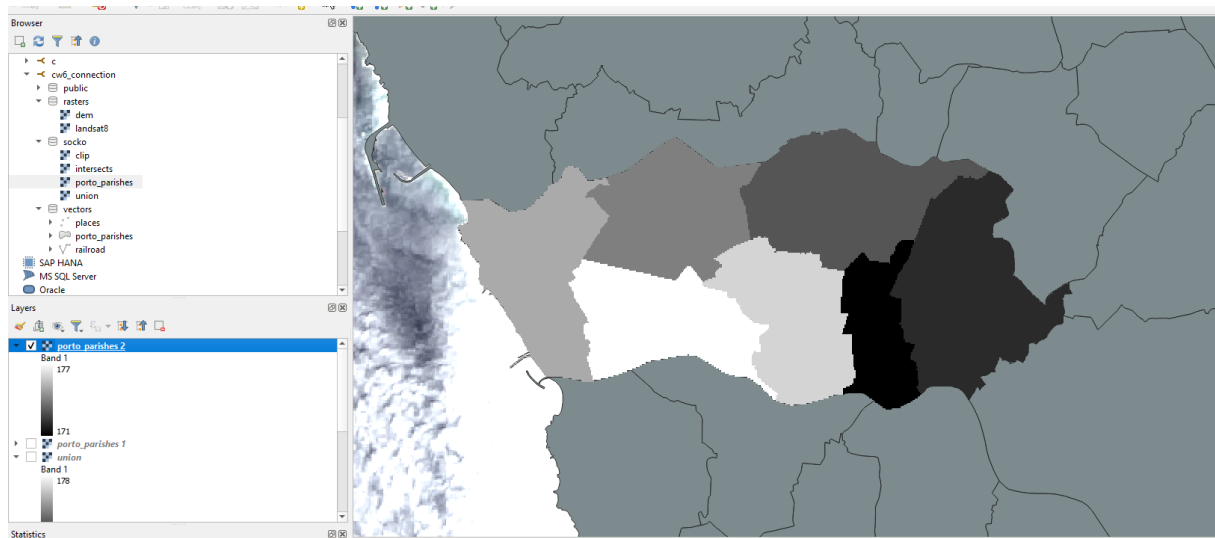
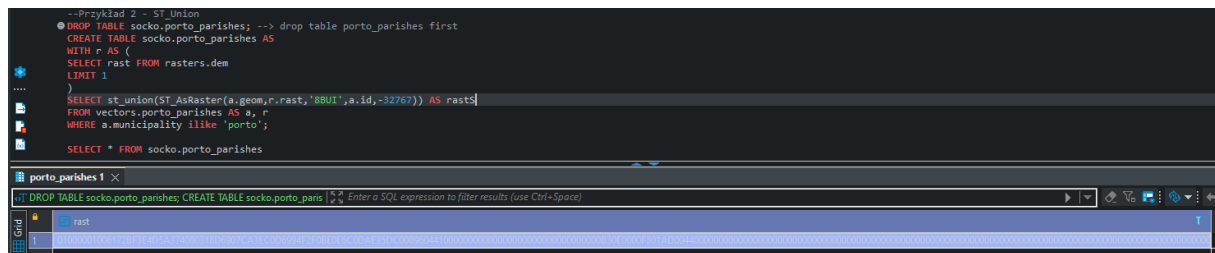
Przykład 2 – ST_Clip



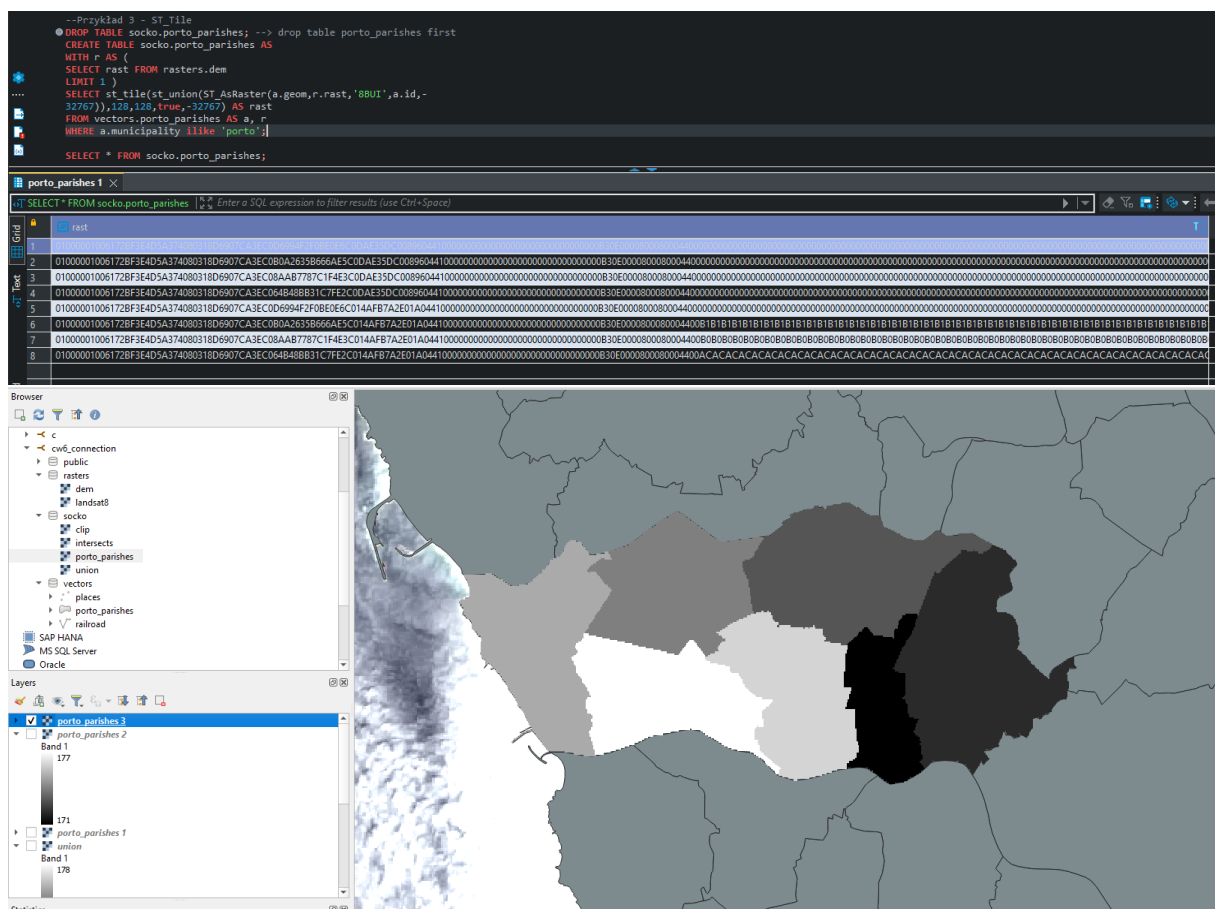
Przykład 1 - ST_AsRaster



Przykład 2 - ST_Union

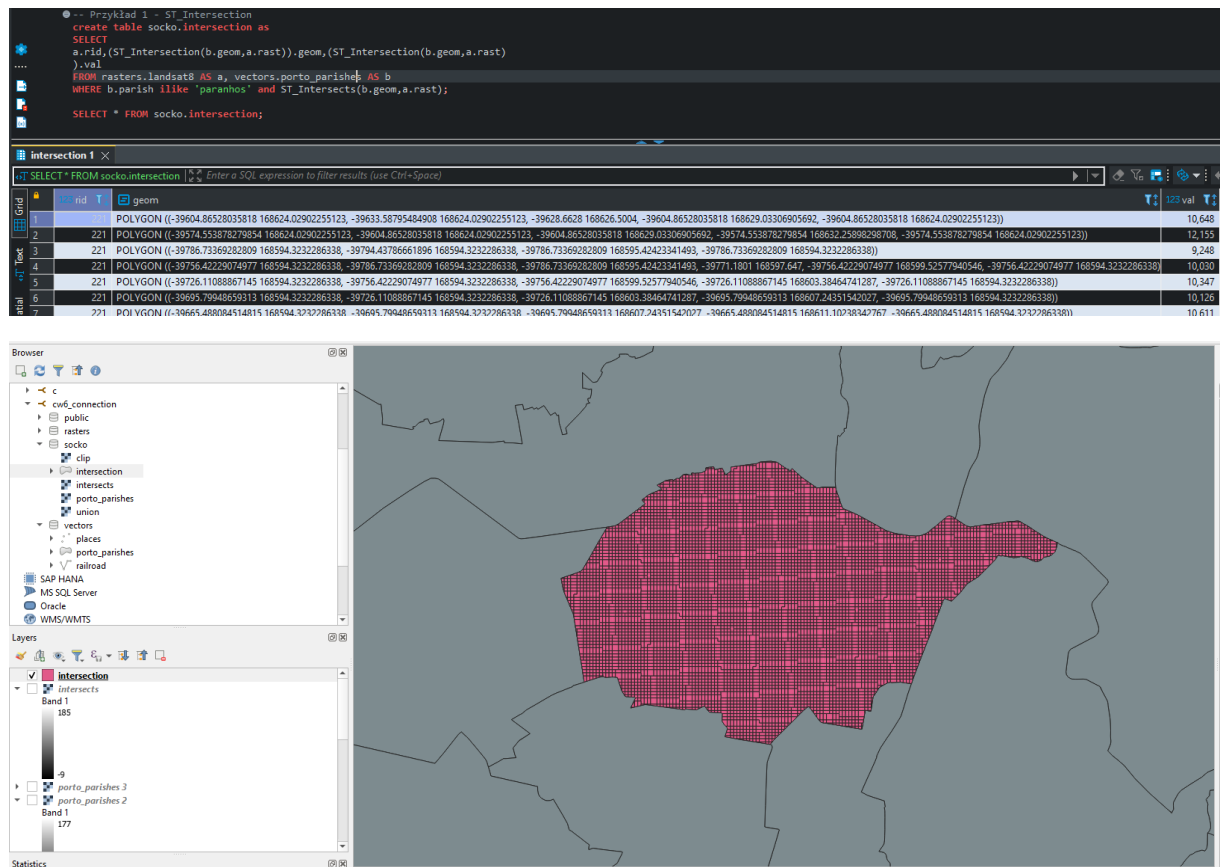


Przykład 3 - ST_Tile

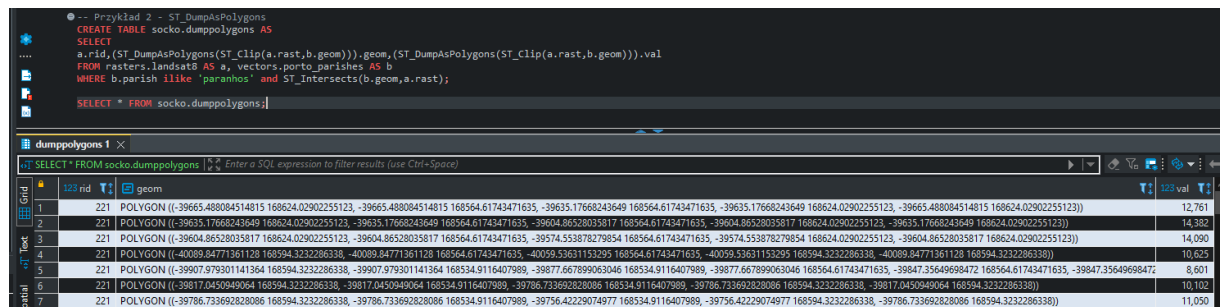


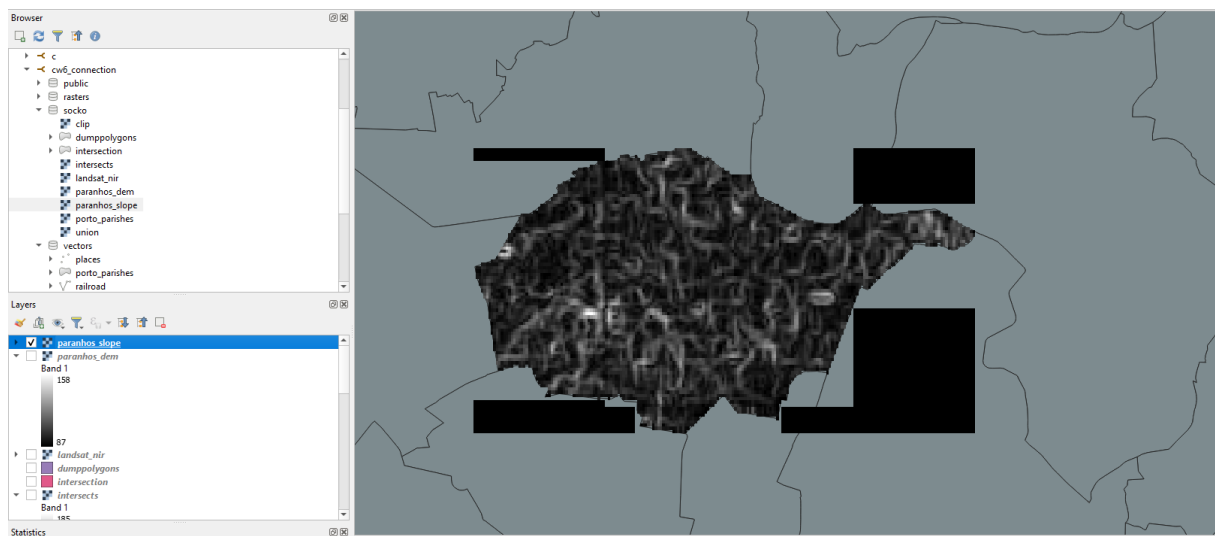
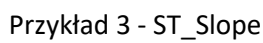
Konwertowanie rastrow na wektory (wektoryzowanie)

Przykład 1 - ST_Intersection

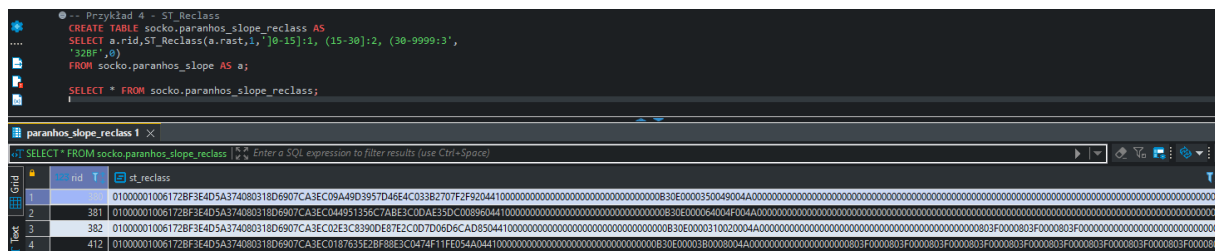


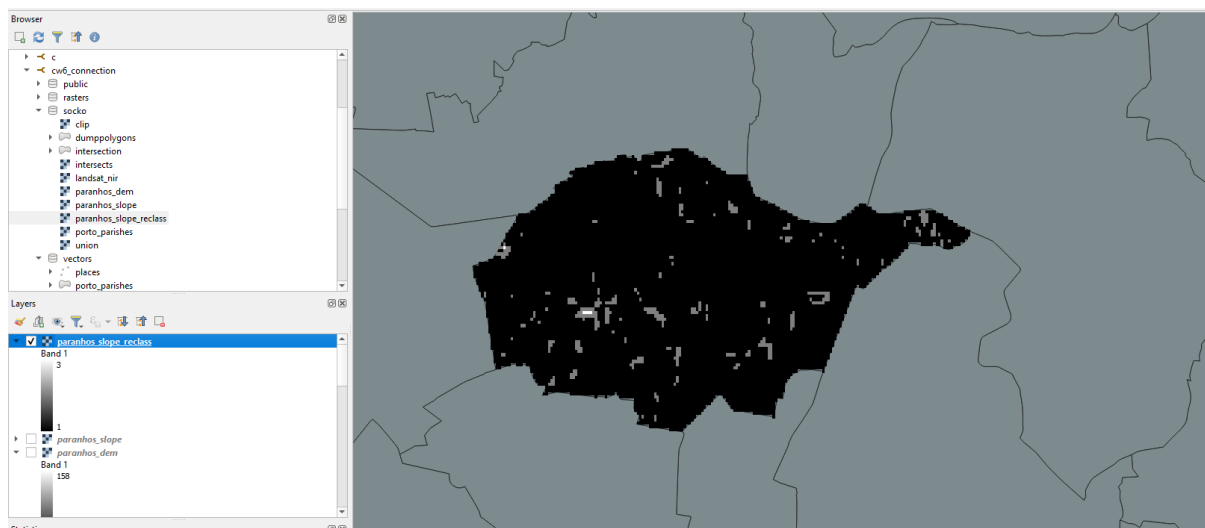
Przykład 2 - ST_DumpAsPolygons





Przykład 4 - ST_Reclass





Przykład 5 - ST_SummaryStats

```
-- Przykład 5 - ST_SummaryStats
SELECT st_summarystats(a.rast) AS stats
FROM socko.paranhos_dem AS a;
```

Results 1

SELECT st_summarystats(a.rast) AS stats FROM socko.paranhos_dem



	stats						
	123 count	123 sum	123 mean	123 stddev	123 min	123 max	
1	2,616	278,385	106.4162844037	11.6226287622	87	143	
2	6,463	816,615	126.3523131673	14.0438229209	94	158	
3	682	95,581	140.1480938416	12.0780721866	103	158	
4	216	31,874	147.5648148148	4.2628306283	137	158	

Przykład 6 - ST_SummaryStats oraz Union

```
-- Przykład 6 - ST_SummaryStats oraz Union
```

```
SELECT st_summarystats(ST_Union(a.rast))  
FROM socko.paranhos_dem AS a;
```

Results 1 ✕

SELECT st_summarystats(ST_Union(a.rast)) FROM socko.paranhos_d |   Enter a SQL expression to filter r

	st_summarystats					
	123 count	123 sum	123 mean	123 stddev	123 min	123 max
1	9,977	1,222,455	122.5273128195	16.9080042027	87	158

Przykład 7 - ST_SummaryStats z lepszą kontrolą złożonego typu danych

Przykład 7 - ST_SummaryStats z lepszą kontrolą złożonego typu danych

```

WITH t AS (
  SELECT st_summarystats(ST_Union(a.rast)) AS stats
  FROM socko.paranhos_dem AS a
)
SELECT (stats).min,(stats).max,(stats).mean FROM t;

```

Results 1

	123 min	123 max	123 mean
1	87	158	122.5273128195

Przykład 8 - ST_SummaryStats w połączeniu z GROUP BY

Przykład 8 - ST_SummaryStats w połączeniu z GROUP BY

```

WITH t AS (
  SELECT b.parish AS parish, st_summarystats(ST_Union(ST_Clip(a.rast,
    b.geom,true))) AS stats
  FROM rasters.dem AS a, vectors.porto_parishes AS b
  WHERE b.municipality ilike 'porto' and ST_Intersects(b.geom,a.rast)
  group by b.parish
)
SELECT parish,(stats).min,(stats).max,(stats).mean FROM t;

```

porto_parishes 1

	asc parish	123 min	123 max	123 mean
1	Bonfim	1	159	107.5658842668
2	Campanhã	0	178	74.6673221309
3	Paranhos	87	158	122.5273128195
4	Ramalde	48	108	77.5844444444
5	União das freguesias de Aldoar, Foz do Douro e Nevogilde	-4	83	34.6673548979
6	União das freguesias de Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau e Vitória	1	157	95.0027774104
7	União das freguesias de Lordelo do Ouro e Massarelos	-1	117	49.5005144033

Przykład 9 - ST_Value


places 1 ✕

	abc name	123 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	

```
-- Przykład 10 - ST_TPI
create table socko.tpi30 as
select ST_TPI(a.rast,1) as rast
from rasters.dem a;

SELECT * FROM socko.tpi30;
```

tpi30 1 ×

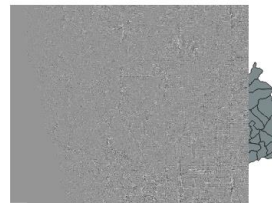
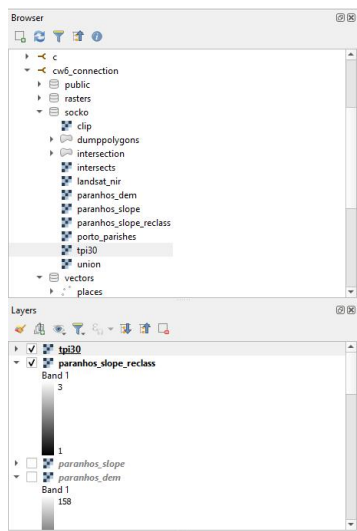
SELECT * FROM socko.tpi30  Enter a SQL expression to filter results (use Ctrl+Space)

[illegible]

Results 1 ✕

```
SELECT AddRasterConstraints('socko'::name, 'tpi30'::name, 'rast'::nar
```

	addrasterconstraints	
1	[v]	



Przykład do samodzielnego rozwiązania:

Czas działania przed:

1 row(s) fetched - 33.795s (8ms fetch), on 2022-11-28 at 21:39:40

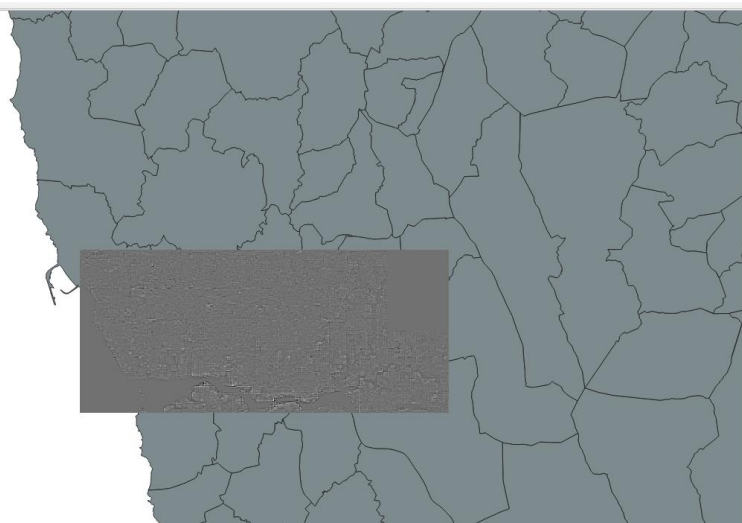
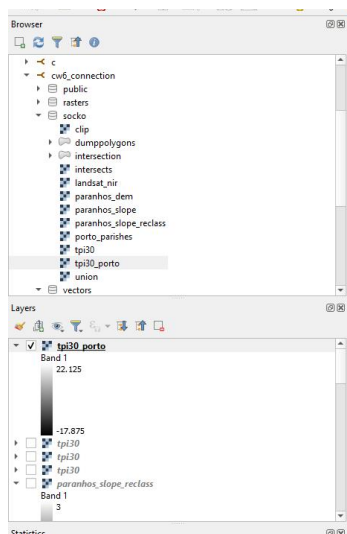
Czas działania po:

1 row(s) fetched - 1.926s, on 2022-11-28 at 21:44:43

```
-- Problem do samodzielnego rozwiązania
create table socko.tpi30_porto as
SELECT ST_TPI(a.rast,1) as rast
FROM rasters.dem AS a, vectors.porto_parishes AS b
WHERE ST_Intersects(a.rast, b.geom) AND b.municipality ilike 'porto';

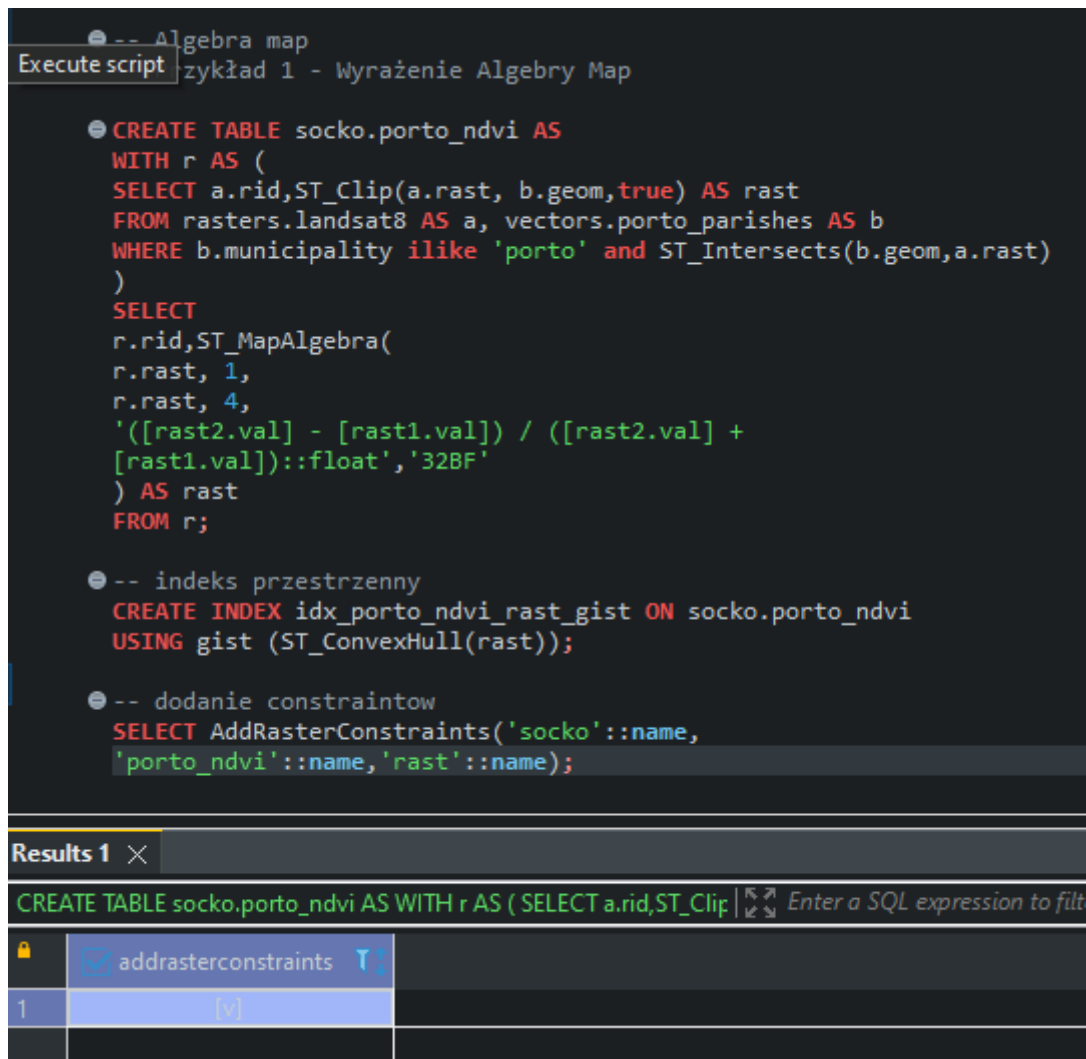
CREATE INDEX idx_tpi30_porto_rast_gist ON socko.tpi30_porto
USING gist (ST_ConvexHull(rast));

SELECT AddRasterConstraints('socko'::name,
'tpi30_porto'::name,'rast'::name);
```



Algebra map

Przykład 1 - Wyrażenie Algebra Map



```
-- Algebra map
Execute script Przykład 1 - Wyrażenie Algebra Map

CREATE TABLE socko.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;

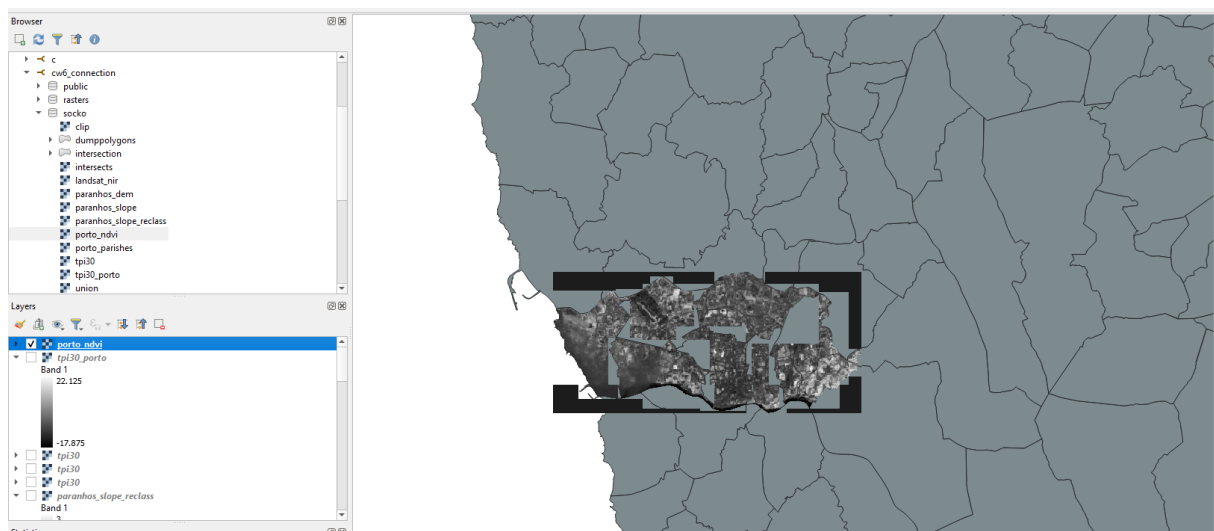
-- indeks przestrzenny
CREATE INDEX idx_porto_ndvi_rast_gist ON socko.porto_ndvi
USING gist (ST_ConvexHull(rast));

-- dodanie constraintow
SELECT AddRasterConstraints('socko'::name,
  'porto_ndvi'::name, 'rast'::name);
```

Results 1

CREATE TABLE socko.porto_ndvi AS WITH r AS (SELECT a.rid,ST_Clip

	addrasterconstraints
1	[v]



Przykład 2 – Funkcja zwrotna

```

-- Przykład 2 - Funkcja zwrotna
create or replace function socko.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;

CREATE TABLE socko.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)

```

Results 1 ✕

create or replace function socko.ndvi(value double precision [] [] [], | Enter a SQL expression to filter results

	<input checked="" type="checkbox"/> add raster constraints	
1	[v]	

Przykład 3 - Funkcje TPI


```

CREATE TABLE socko.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],
'socko.ndvi(double precision[],
integer[],text[])':regprocedure, --> This is the function!
'32BF'::text
) AS rast
FROM r;

-- indeks przestrzenny
CREATE INDEX idx_porto_ndvi2_rast_gist ON socko.porto_ndvi2
USING gist (ST_ConvexHull(rast));

-- dodanie constraintow
SELECT AddRasterConstraints('socko'::name,
'porto_ndvi2'::name,'rast'::name);

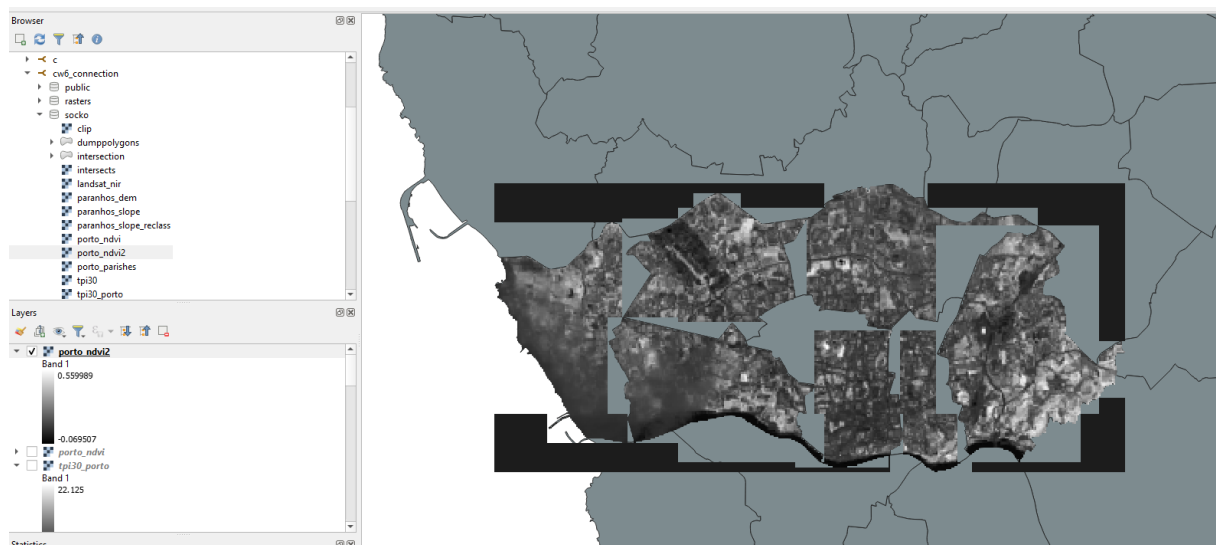
```

Results 1

create or replace function socko.ndvi(value double precision [] [] [], | Enter a SQL expression to filter results (use Ctrl+Space

addrasterconstraints

1 [v]



Przykład 3 - Funkcje TPI

```
CREATE OR REPLACE FUNCTION public._st_tpi4ma(value double precision[], pos integer[], VARIADIC userargs text[] DEFAULT NULL::text[])
RETURNS double precision
LANGUAGE plpgsql
IMMUTABLE PARALLEL SAFE
AS $function$
DECLARE
    x integer;
    y integer;
    z integer;

    Z1 double precision;
    Z2 double precision;
    Z3 double precision;
    Z4 double precision;
    Z5 double precision;
    Z6 double precision;
    Z7 double precision;
    Z8 double precision;
    Z9 double precision;

    tpi double precision;
    mean double precision;
    _value double precision[][][];
    ndims int;
BEGIN
    ndims := array_ndims(value);
    -- add a third dimension if 2-dimension
    IF ndims = 2 THEN
        _value := public._ST_convertarray4ma(value);
    ELSEIF ndims != 3 THEN
        RAISE EXCEPTION 'First parameter of function must be a 3-dimension array';
    ELSE
        _value := value;
    END IF;

    -- only use the first raster passed to this function
    IF array_length(_value, 1) > 1 THEN
        RAISE NOTICE 'Only using the values from the first raster';
    END IF;
    z := array_lower(_value, 1);

    IF (
        array_lower(_value, 2) != 1 OR array_upper(_value, 2) != 3 OR
        array_lower(_value, 3) != 1 OR array_upper(_value, 3) != 3
    ) THEN
        RAISE EXCEPTION 'First parameter of function must be a 1x3x3 array with each of the lower bounds starting from 1';
    END IF;

    -- check that center pixel isn't NODATA
    IF value[1][2][2] IS NULL THEN
```

Jedna z funkcji st_tpi:

```
CREATE OR REPLACE FUNCTION public.st_tpi(rast raster, nband integer DEFAULT 1, pixeltypes text DEFAULT '32BF'::text, interpolate_nodata boolean DEFAULT false)
RETURNS raster
LANGUAGE sql
IMMUTABLE PARALLEL SAFE
AS $function$ SELECT public.ST_tpi($1, $2, NULL::public.raster, $3, $4) $function$
;
```

Eksport danych

Przykład 0 - Użycie QGIS

Save Raster Layer as...

Output mode ☒ Raw data ☐ Rendered image

Format GeoTIFF ☐ Create VRT

File name porto_ndvi

Layer name

CRS EPSG:3763 - ETRS89 / Portugal TM06

▼ Extent (current: layer)

North 168653.7348

West -46849.2904 East -35209.7120

South 163336.3977

Calculate from Layer Layout Map Bookmark

Current Layer Extent Map Canvas Extent

▼ Resolution (current: layer)

☒ Horizontal 30.3114 Vertical 29.7058 Layer Resolution

☐ Columns 384 Rows 179 Layer Size

▼ ☐ Create Options

Profile Default

Name	Value
------	-------

☒ Add saved file to map OK Cancel Help

Przykład 1 - ST_AsTiff

```
-- Przykład 1 - ST_AsTiff
SELECT ST_AsTiff(ST_Union(rast))
FROM socko.porto_ndvi;
```

Results 1

```
SELECT ST_AsTiff(ST_Union(rast)) FROM socko.porto_ndvi
```

st_astiff
1 ... [275539]

Przykład 2 - ST_AsGDALRaster

```
-- Przykład 2 - ST_AsGDALRaster
SELECT ST_AsGDALRaster(ST_Union(rast), 'GTiff', ARRAY['COMPRESS=DEFLATE',
'PREDICTOR=2', 'PZLEVEL=9'])
FROM socko.porto_ndvi;
```

Results 1 ×

SELECT ST_AsGDALRaster(ST_Union(rast), 'GTiff', ARRAY['COMPRESS | Enter a SQL expression to filter results

st_asgdalraster	
1	11" ... [148838]

```
SELECT ST_GDALDrivers();
```

Results 1 ×

SELECT ST_GDALDrivers() | Enter a SQL expression to filter results (use Ctrl+Space)

st_gdaldrivers	
1	(1,AAIGrid,"Arc/Info ASCII Grid",t,t,"<CreationOptionList>1 <Option name='FORCE_CELLSIZE' type='boolean' description='Force use of CELLSIZE, default is FALSE./>1 <Option name='DECIMAL_PRECISION' ty
2	(2,DTED,"DTED Elevation Raster",t,t,"")
3	(3,PNG,"Portable Network Graphics",t,t,"<CreationOptionList>1 <Option name='WORLDFILE' type='boolean' description='Create world file' default='FALSE'/>1 <Option name='ZLEVEL' type='int' description=
4	(4,JPEG,"JPEG JFIF",t,t,"<CreationOptionList>1 <Option name='PROGRESSIVE' type='boolean' description='whether to generate a progressive JPEG' default='NO'/>1 <Option name='QUALITY' type='int' descrip
5	(5,GIF,"Graphics Interchange Format (.gif)",t,t,"<CreationOptionList>1 <Option name='INTERLACING' type='boolean'/>1 <Option name='WORLDFILE' type='boolean'/>1</CreationOptionList>1")
6	(6,USGSD,"USGS Optional ASCII DEM (and CDED)",t,t,"<CreationOptionList> <Option name='PRODUCT' type='string-select' description='Specific Product Type'> <Value>DEFAULT</Value> <Value>C
7	(7,XYZ,"ASCII Gridded XYZ",t,t,"<CreationOptionList> <Option name='COLUMN_SEPARATOR' type='string' default=' ' description='Separator between fields./> <Option name='ADD_HEADER_LINE' type='bo

Przykład 3 - Zapisywanie danych na dysku za pomocą dużego obiektu (large object, lo)

```
-- Przykład 3
CREATE TABLE tmp_out AS
SELECT lo_from_bytea(0,
ST_AsGDALRaster(ST_Union(rast), 'GTiff', ARRAY['COMPRESS=DEFLATE',
'PREDICTOR=2', 'PZLEVEL=9']))
AS lo_id
FROM socko.porto_ndvi;

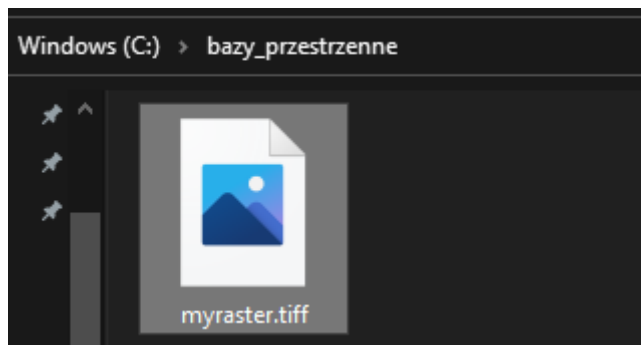
SELECT lo_export(lo_id, 'C:\bazy_przestrzenne\myraster.tif') --> Save the file in a place where the user postgres have access. In windows a flash drive usually works fine.
FROM tmp_out;

SELECT lo_unlink(lo_id)
FROM tmp_out; --> Delete the large object.
```

Results 1 × **Results 1 (2)** ×

CREATE TABLE tmp_out AS SELECT lo_from_bytea(0, ST_AsGDALRast | Data filter is not supported

123 lo_unlink	
1	1

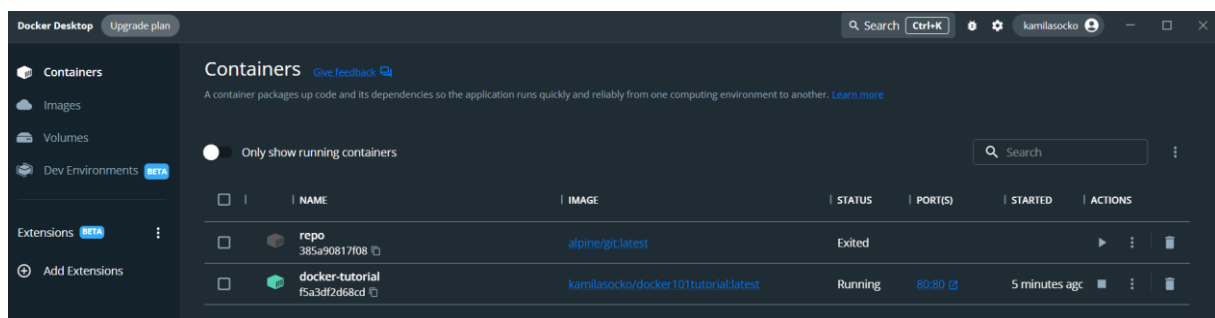


Przykład 4 - Użycie Gdal

```
Input file size is 384, 179
ERROR 1: PROJ: proj_create_from_database: C:\Program Files\PostgreSQL\14\share\contrib\postgis-3.3\proj\proj.db contains
DATABASE.LAYOUT.VERSION.MINOR = 0 whereas a number >= 2 is expected. It comes from another PROJ installation.
Warning 1: PROJ: proj_create_from_database: C:\Program Files\PostgreSQL\14\share\contrib\postgis-3.3\proj\proj.db contains
DATABASE.LAYOUT.VERSION.MINOR = 0 whereas a number >= 2 is expected. It comes from another PROJ installation.
Warning 1: The definition of projected CRS EPSG:3763 got from GeoTIFF keys is not the same as the one from the EPSG registry,
which may cause issues during reprojection operations. Set GTIFF_SRS_SOURCE configuration option to EPSG to use of
ficial parameters (overriding the ones from GeoTIFF keys), or to GEOKEYS to use custom values from GeoTIFF keys and drop
the EPSG code.
9...10...20...30...40...50...60...70...80...90...100 - done.
```

Publikowanie danych za pomocą MapServer

Przykład 1 – Mapfile



```
kamiilasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32$ git clone https://github.com/kartoza/docker-mapserver
Cloning into 'docker-mapserver'...
remote: Enumerating objects: 231, done.
remote: Counting objects: 100% (35/35), done.
remote: Compressing objects: 100% (7/7), done.
remote: Total 231 (delta 28), reused 28 (delta 28), pack-reused 196
Receiving objects: 100% (231/231), 39.95 MiB | 4.69 MiB/s, done.
Resolving deltas: 100% (104/104), done.
Updating files: 100% (20/20), done.
```

```
kamiilasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$ docker build -t kartoza/mapserver_kartoza .
[+] Building 849.4s (14/27)
=> [internal] load .dockerignore                                0.0s
=> => transferring context: 2B                                  0.0s
=> [internal] load metadata for docker.io/library/ubuntu:focal  3.1s
=> [auth] library/ubuntu:pull token for registry-1.docker.io   0.0s
=> [ 1/22] FROM docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  8.1s
=> => resolve docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  0.0s
=> => sha256:680e5dfb52c74a1fbc99c2922c8e25b5736e6cd1a3d9430890d52a4f8f44087a 1.46kB / 1.46kB  0.0s
=> => sha256:eaead16dc43bb8811d4ff450935d607f9ba4baffda4fc110cc402fa43f601d83 28.58MB / 28.58MB  6.1s
=> => sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec61dbd 1.42kB / 1.42kB  0.0s
=> => sha256:b25ef49a40b7797937d0d23eca3b0a41701af6757afca23d504d50826f0b37ce 529B / 529B  0.0s
=> => extracting sha256:eaead16dc43bb8811d4ff450935d607f9ba4baffda4fc110cc402fa43f601d83 1.1s
=> [internal] load build context                                0.0s
[+] Building 861.0s (14/27)
=> [internal] load .dockerignore                                0.0s
=> => transferring context: 2B                                  0.0s
[+] Building 1149.3s (28/28) FINISHED
=> [internal] load build definition from Dockerfile            0.0s
=> => transferring dockerfile: 3.43kB                          0.0s
=> [internal] load .dockerignore                                0.0s
=> => transferring context: 2B                                  0.0s
=> [internal] load metadata for docker.io/library/ubuntu:focal  3.1s
=> [auth] library/ubuntu:pull token for registry-1.docker.io   0.0s
=> [ 1/22] FROM docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  8.1s
=> => resolve docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  0.0s
=> => sha256:680e5dfb52c74a1fbc99c2922c8e25b5736e6cd1a3d9430890d52a4f8f44087a 1.46kB / 1.46kB  0.0s
=> => sha256:eaead16dc43bb8811d4ff450935d607f9ba4baffda4fc110cc402fa43f601d83 28.58MB / 28.58MB  6.1s
```

```
kamiilasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver
=> => transferring dockerfile: 3.43kB                          0.0s
=> [internal] load .dockerignore                                0.0s
=> => transferring context: 2B                                  0.0s
=> [internal] load metadata for docker.io/library/ubuntu:focal  3.2s
=> [auth] library/ubuntu:pull token for registry-1.docker.io   0.0s
=> [ 1/22] FROM docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  8.0s
=> => resolve docker.io/library/ubuntu:focal@sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec6  0.0s
=> => sha256:680e5dfb52c74a1fbc99c2922c8e25b5736e6cd1a3d9430890d52a4f8f44087a 1.46kB / 1.46kB  0.0s
=> => sha256:eaead16dc43bb8811d4ff450935d607f9ba4baffda4fc110cc402fa43f601d83 28.58MB / 28.58MB  6.5s
=> => sha256:450e066588f42ebe1551f3b1a535034b6aa46cd936fe7f2c6b0d72997ec61dbd 1.42kB / 1.42kB  0.0s
=> => sha256:b25ef49a40b7797937d0d23eca3b0a41701af6757afca23d504d50826f0b37ce 529B / 529B  0.0s
=> => extracting sha256:eaead16dc43bb8811d4ff450935d607f9ba4baffda4fc110cc402fa43f601d83 1.2s
=> [internal] load build context                                0.0s
=> => transferring context: 3.97kB                              0.0s
=> [ 2/22] RUN apt-get -qq update --fix-missing && apt-get -qq --yes upgrade 14.6s
=> [ 3/22] RUN DEBIAN_FRONTEND=noninteractive apt-get install -y software-properties-common g++ make cmake wget 158.8s
=> [ 4/22] RUN apt-get install -y --fix-missing --no-install-recommends libxml2-dev libxslt1-dev lib 49.7s
=> [ 5/22] RUN apt-get install -y libgdal-dev 27.2s
=> [ 6/22] RUN apt-get install -y php7.4-fpm libapache2-mod-php7.4 php7.4-common php7.4-cli php7.4 php7.4 ph 29.2s
=> [ 7/22] ADD resources /tmp/resources 0.0s
=> [ 8/22] ADD setup.sh /setup.sh 0.0s
=> [ 9/22] RUN chmod 0755 /setup.sh 0.5s
=> [10/22] RUN /setup.sh 820.4s
=> [11/22] RUN cp /tmp/resources/000-default.conf /etc/apache2/sites-available/ 0.6s
=> [12/22] RUN wget http://mirrors.kernel.org/ubuntu/pool/multiverse/liba/libapache2-mod-fastcgi/libapache2-mod-f 5.4s
=> [13/22] RUN cp /tmp/resources/php7-fpm.conf /etc/apache2/conf-available/ 1.0s
=> [14/22] RUN a2enmod actions cgi alias proxy_fcgi fastcgi headers 0.9s
=> [15/22] RUN a2enconf php7.4-fpm 0.8s
=> [16/22] RUN chmod o+x /usr/local/bin/mapserv 0.9s
=> [17/22] RUN ln -s /usr/local/bin/mapserv /usr/lib/cgi-bin/mapserv 0.7s
=> [18/22] RUN chmod 755 /usr/lib/cgi-bin 0.5s
=> [19/22] RUN wget https://github.com/jwilder/dockerize/releases/download/v0.6.1/dockerize-linux-amd64-v0.6.1.t 2.6s
=> [20/22] RUN apt-get install -y net-tools 4.3s
=> [21/22] RUN mv /usr/local/lib/libcurl.so.4.4.0 /usr/local/lib/libcurl.so.4.4.0.backup 0.5s
=> [22/22] RUN apt-get clean && rm -rf /var/lib/apt/lists/* /tmp/* /var/tmp/* 1.2s
=> exporting to image 17.9s
=> => exporting layers 17.8s
=> => writing image sha256:4b1daf0e4055eeb1ff5ee802e3dbd111147353e1084a39879ed960b1357355ea 0.0s
=> => naming to docker.io/kartoza/mapserver_kartoza 0.0s
```

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them

```
kamiilasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$
```



```
kamilliasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$ sudo docker run -d -p 8182:80 --name mapserver2 kartoza/mapserver_kartoza
adf06d4aa535f8fa23582863df7151e50393a106322dd3d4e93cd5d38c766816
kamilliasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$ ls
71-apt-cacher-ng Dockerfile README.md build.sh dem.map docker-compose.yml generic-map-browse-mode-screenshot.png map resources setup.sh
kamilliasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$ ls -la
total 381
drwxrwxrwx 1 kamilliasocko kamilliasocko 512 Nov 30 12:15 .
drwxrwxrwx 1 kamilliasocko kamilliasocko 512 Nov 30 02:10 ..
drwxrwxrwx 1 kamilliasocko kamilliasocko 512 Nov 29 23:37 .git
-rwxrwxrwx 1 kamilliasocko kamilliasocko 11 Nov 29 23:37 .gitignore
-rwxrwxrwx 1 kamilliasocko kamilliasocko 428 Nov 29 23:37 71-apt-cacher-ng
-rwxrwxrwx 1 kamilliasocko kamilliasocko 3383 Nov 30 12:15 Dockerfile
-rwxrwxrwx 1 kamilliasocko kamilliasocko 2421 Nov 29 23:37 README.md
-rwxrwxrwx 1 kamilliasocko kamilliasocko 57 Nov 29 23:37 build.sh
-rwxrwxrwx 1 kamilliasocko kamilliasocko 619 Nov 30 02:00 dem.map
-rwxrwxrwx 1 kamilliasocko kamilliasocko 990 Nov 30 02:10 docker-compose.yml
-rwxrwxrwx 1 kamilliasocko kamilliasocko 368657 Nov 29 23:37 generic-map-browse-mode-screenshot.png
drwxrwxrwx 1 kamilliasocko kamilliasocko 512 Nov 30 11:29 map
drwxrwxrwx 1 kamilliasocko kamilliasocko 512 Nov 29 23:37 resources
```

```
kamilliasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32/docker-mapserver$ sudo docker exec -it mapserver2 /bin/bash
root@adf06d4aa535:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin setup.sh srv sys tmp usr var
root@adf06d4aa535:/# ls -la
total 76
drwxr-xr-x 1 root root 4096 Nov 30 11:43 .
drwxr-xr-x 1 root root 4096 Nov 30 11:43 ..
-rwxr-xr-x 1 root root 0 Nov 30 11:43 .dockerenv
lrwxrwxrwx 1 root root 7 Oct 19 16:47 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Apr 15 2020 boot
drwxr-xr-x 5 root root 340 Nov 30 11:43 dev
drwxr-xr-x 1 root root 4096 Nov 30 11:43 etc
drwxr-xr-x 2 root root 4096 Apr 15 2020 home
lrwxrwxrwx 1 root root 7 Oct 19 16:47 lib -> usr/lib
lrwxrwxrwx 1 root root 9 Oct 19 16:47 lib32 -> usr/lib32
lrwxrwxrwx 1 root root 9 Oct 19 16:47 lib64 -> usr/lib64
lrwxrwxrwx 1 root root 10 Oct 19 16:47 libx32 -> usr/libx32
drwxr-xr-x 2 root root 4096 Oct 19 16:47 media
drwxr-xr-x 2 root root 4096 Oct 19 16:47 mnt
drwxr-xr-x 2 root root 4096 Oct 19 16:47 opt
dr-xr-xr-x 258 root root 0 Nov 30 11:43 proc
drwx----- 1 root root 4096 Nov 29 22:56 root
drwxr-xr-x 1 root root 4096 Nov 29 22:43 run
lrwxrwxrwx 1 root root 8 Oct 19 16:47 sbin -> usr/sbin
-rwxr-xr-x 1 root root 2407 Nov 29 22:37 setup.sh
drwxr-xr-x 2 root root 4096 Oct 19 16:47 srv
dr-xr-xr-x 11 root root 0 Nov 30 11:43 sys
drwxrwxrwt 1 root root 4096 Nov 30 11:43 tmp
drwxr-xr-x 1 root root 4096 Nov 29 22:41 usr
drwxr-xr-x 1 root root 4096 Nov 29 22:41 var
```

```
root@adf06d4aa535:/# mkdir /map && touch /map/dem.map && chown -R root /map && chmod -R 777 /map
root@adf06d4aa535:/# ls -la
total 80
drwxr-xr-x 1 root root 4096 Nov 30 11:45 .
drwxr-xr-x 1 root root 4096 Nov 30 11:45 ..
-rwxr-xr-x 1 root root 0 Nov 30 11:43 .dockerenv
lrwxrwxrwx 1 root root 7 Oct 19 16:47 bin -> usr/bin
drwxr-xr-x 2 root root 4096 Apr 15 2020 boot
drwxr-xr-x 5 root root 340 Nov 30 11:43 dev
drwxr-xr-x 1 root root 4096 Nov 30 11:43 etc
drwxr-xr-x 2 root root 4096 Apr 15 2020 home
lrwxrwxrwx 1 root root 7 Oct 19 16:47 lib -> usr/lib
lrwxrwxrwx 1 root root 9 Oct 19 16:47 lib32 -> usr/lib32
lrwxrwxrwx 1 root root 9 Oct 19 16:47 lib64 -> usr/lib64
lrwxrwxrwx 1 root root 10 Oct 19 16:47 libx32 -> usr/libx32
drwxrwxrwx 2 root root 4096 Nov 30 11:45 map
drwxr-xr-x 2 root root 4096 Oct 19 16:47 media
drwxr-xr-x 2 root root 4096 Oct 19 16:47 mnt
drwxr-xr-x 2 root root 4096 Oct 19 16:47 opt
dr-xr-xr-x 259 root root 0 Nov 30 11:43 proc
drwx----- 1 root root 4096 Nov 29 22:56 root
drwxr-xr-x 1 root root 4096 Nov 29 22:43 run
lrwxrwxrwx 1 root root 8 Oct 19 16:47 sbin -> usr/sbin
-rwxr-xr-x 1 root root 2407 Nov 29 22:37 setup.sh
drwxr-xr-x 2 root root 4096 Oct 19 16:47 srv
dr-xr-xr-x 11 root root 0 Nov 30 11:43 sys
drwxrwxrwt 1 root root 4096 Nov 30 11:43 tmp
drwxr-xr-x 1 root root 4096 Nov 29 22:41 usr
drwxr-xr-x 1 root root 4096 Nov 29 22:41 var
root@adf06d4aa535:/# cd map
root@adf06d4aa535:/map# ls
dem.map
```

```
root@adf06d4aa535:/map# apt-get update
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:2 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [27.5 kB]
Get:3 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [2315 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal InRelease [265 kB]
Get:5 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [1712 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [967 kB]
Get:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:9 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [11.3 MB]
Get:10 http://archive.ubuntu.com/ubuntu focal/multiverse amd64 Packages [177 kB]
Get:11 http://archive.ubuntu.com/ubuntu focal/restricted amd64 Packages [33.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu focal/main amd64 Packages [1275 kB]
Get:13 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [2786 kB]
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [1829 kB]
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [1268 kB]
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 Packages [30.2 kB]
Get:17 http://archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [55.2 kB]
Get:18 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [27.4 kB]
Fetched 24.4 MB in 8s (3168 kB/s)
Reading package lists... Done
root@adf06d4aa535:/map# apt-get install vim
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libjpeg62
```

```
root@adf06d4aa535:/map# vim dem.map
root@adf06d4aa535:/map# ls
dem.map
```

```
MAP
    NAME 'map'
    SIZE 800 650
    STATUS ON
    EXTENT -58968 145487 30916 206234
    UNITS METERS
    WEB
        METADATA
            'wms_title' 'Terrain wms'
            'wms_srs' 'EPSG:3763 EPSG:4326 EPSG:3857'
            'wms_enable_request' '*'
            'wms_onlineresource'
            'http://54.37.13.53/mapservices/srtm'
        END
    END
    PROJECTION
        'init=epsg:3763'
    END
    LAYER
        NAME srtm
        TYPE raster
        STATUS OFF
        DATA "PG:host=host.docker.internal port=5433 dbname=cw6
        user=postgres password=[REDACTED] schema=rasters table=dem mode=2"
        PROCESSING "SCALE=AUTO"
        PROCESSING "NODATA=-32767"
        OFFSITE 0 0 0
        METADATA
            'wms_title' 'srtm'
        END
    END
END
```

```
root@adf06d4aa535:/map# ls -la
total 12
drwxrwxrwx 2 root root 4096 Nov 30 11:46 .
drwxr-xr-x 1 root root 4096 Nov 30 11:45 ..
-rwxrwxrwx 1 root root 631 Nov 30 11:46 dem.map
```

```
root@adf06d4aa535:/# apt-get install -y postgresql-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libjpeg62
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  postgresql-client-12 postgresql-client-common
Suggested packages:
  postgresql-12 postgresql-doc-12
The following NEW packages will be installed:
```

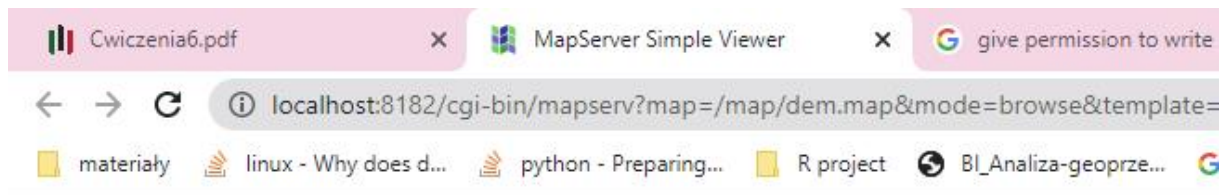
psql postgresql://postgres:haslo@host.docker.internal:5433/cw6

```
psql (12.12 (Ubuntu 12.12-0ubuntu0.20.04.1), server 14.5)
WARNING: psql major version 12, server major version 14.
        Some psql features might not work.
Type "help" for help.
```

```
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
cw6=#
```

```
cw6-# \dn
      List of schemas
  Name  | Owner
-----+-----
 public | postgres
 rasters | postgres
 socko  | postgres
 vectors | postgres
(4 rows)




cw6-#
```




Publikowanie danych za pomocą GeoServer

```
kamilasocko@LAPTOP-J7HC0HAD:/mnt/c/WINDOWS/system32$ sudo apt-get install tomcat9
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ca-certificates-java default-jre-headless java-common libapr1 libavahi-client3 libavahi-common-
  libjpeg-turbo8 libjpeg8 liblcms2-2 libnspr4 libnss3 libpcsc-lite1 libtcnative-1 libtomcat9-java
Suggested packages:
  default-jre cups-common liblcms2-utils nsscd libnss-mdns fonts-dejavu-extra fonts-ipafont-gothic
```


C:) > ProgramData > GeoServer > data > test

Name	Date modified	Type	Size
 connect.pgraster.xml.inc	11/30/2022 2:15 PM	Include File	1 KB
 mapping.pgraster.xml.inc	11/30/2022 2:02 PM	Include File	1 KB
 mosaicpgraster.pgraster.xml	11/30/2022 2:05 PM	XML Document	1 KB

 connect.pgraster.xml.inc - Notepad

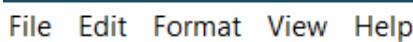
File Edit Format View Help

```
<connect>
  <dstype value="DBCP"/>
  <username value="postgres"/>
  <password value="****"/>
  <jdbcUrl value="jdbc:postgresql://localhost:5433/cw6"/>
  <driverClassName value="org.postgresql.Driver"/>
  <maxActive value="10"/>
  <maxIdle value="0"/>
</connect>
```

 mapping.pgraster.xml.inc - Notepad

File Edit Format View Help

```
<spatialExtension name="pgraster"/>
  <mapping>
    <masterTable name="mosaic" >
      <coverageNameAttribute name="name"/>
      <maxXAttribute name="maxX"/>
      <maxYAttribute name="maxY"/>
      <minXAttribute name="minX"/>
      <minYAttribute name="minY"/>
      <resXAttribute name="resX"/>
      <resYAttribute name="resY"/>
      <tileTableNameAttribute name="tiletable" />
    </masterTable>
    <tileTable>
      <blobAttributeName name="rast" />
    </tileTable>
  </mapping>
```

```
<config version="1.0">
  <coverageName name="oek"/>
  <coordsys name="EPSG:3763"/>
  <scaleop interpolation="1"/>
  <axisOrder ignore="false"/>
  &mapping;
  &connect;
</config>
```

The screenshot shows the pgAdmin 4 interface. On the left, the 'Schemas' tree is expanded, showing 'public' > 'Tables'. The 'mosaic' table is highlighted, showing its size as 16k. Below it, the 'rasters' schema is expanded, showing 'Tables' > 'dem' (5.5M) and 'landsat8' (47M). The main pane displays the SQL script for creating the 'mosaic' table and inserting data. The 'mosaic 1' query window is open, showing the SQL statement 'SELECT * FROM mosaic m' and the results of the query. The results table has columns for 'name', 'tiletable', 'minx', 'miny', 'maxx', 'maxy', 'resx', and 'resy'. The first row shows 'mosaicpraster' and 'rasters.dem' with NULL values for the other columns.

Edit Raster Data Source

Description

ImageMosaic
Image mosaicking plugin

Basic Store Info

Workspace *

it.geosolutions ▼

Data Source Name *

mosaicpraster.pgraster

Description

SRTM

☒ Enabled

☐ Auto disable on connection failure

Connection Parameters

URL *

file:data/test/mosaicpraster.pgraster.xml

[Browse...](#)

Save

Apply

Cancel

Could not list layers for this store, an error occurred retrieving them: Failed to create reader from file:data/test/mosaicpraster.pgraster.xml and hints Hints: REPOSITORY = org.geoserver.catalog.CatalogRepository@1d34a35
EXECUTOR_SERVICE = java.util.concurrent.ThreadPoolExecutor@7a98375a[Running, pool size = 0, active threads = 0, queued tasks = 0, completed tasks = 0] System defaults: FEATURE_FACTORY =
org.geotools.feature.LenientFeatureFactoryImpl@322ba549 FORCE_AXIS_ORDER_HONORING = http COMPARISON_TOLERANCE = 1.0E-8 FORCE_LONGITUDE_FIRST_AXIS_ORDER = true STYLE_FACTORY = StyleFactoryImpl
FILTER_FACTORY = FilterFactoryImpl GRID_COVERAGE_FACTORY = GridCoverageFactory TILE_ENCODING = null LENIENT_DATUM_SHIFT = true

New Layer

Add a new layer

Add layer from it.geosolutions:mosaicpraster.pgraster ▼

On stores you can also create a new coverage view by merging different coverages as a multibands coverage. [Configure new Coverage view ...](#)

Could not list layers for this store, an error occurred retrieving them: Failed to create reader from file:data/test/mosaicpraster.pgraster.xml and hints Hints: REPOSITORY = org.geoserver.catalog.CatalogRepository@1d34a35
EXECUTOR_SERVICE = java.util.concurrent.ThreadPoolExecutor@7a98375a[Running, pool size = 0, active threads = 0, queued tasks = 0, completed tasks = 0] System defaults: FEATURE_FACTORY =
org.geotools.feature.LenientFeatureFactoryImpl@322ba549 FORCE_AXIS_ORDER_HONORING = http COMPARISON_TOLERANCE = 1.0E-8 FORCE_LONGITUDE_FIRST_AXIS_ORDER = true STYLE_FACTORY = StyleFactoryImpl
FILTER_FACTORY = FilterFactoryImpl GRID_COVERAGE_FACTORY = GridCoverageFactory TILE_ENCODING = null LENIENT_DATUM_SHIFT = true

Prawdopodobny powód: gdal nie działa, a jest wymagane do użycia w tym przykładzie.