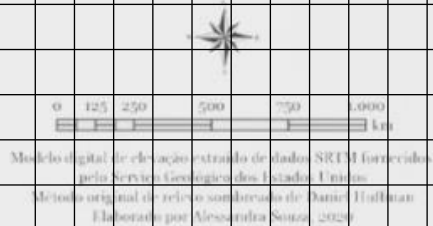


# Preenchimento de células

MAPA DE ELEVAÇÃO  
DO  
BRASIL

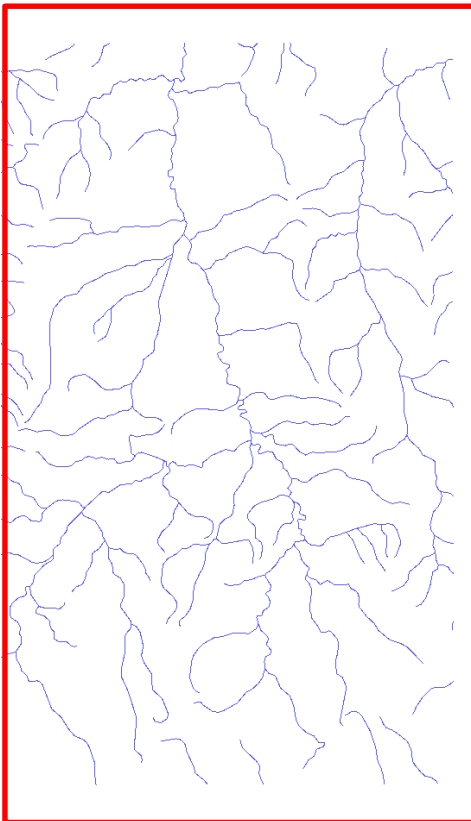


Lidiane Costa  
Isabel Escada  
(2021)

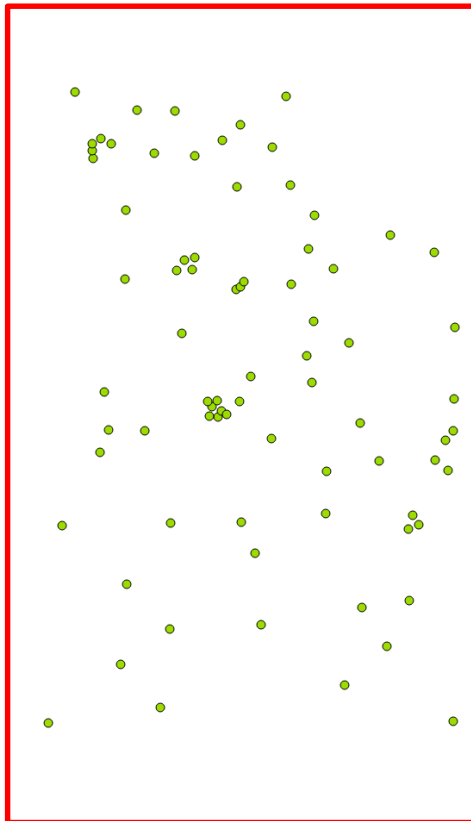
# PREENCHIMENTO DE CÉLULAS

Seu objetivo é homogeneizar informações provenientes de diferentes fontes, em formatos distintos (dados vetoriais, matriciais e também outros planos celulares), agregando-os em uma mesma base espaço-temporal. (Gavlak & Escada)

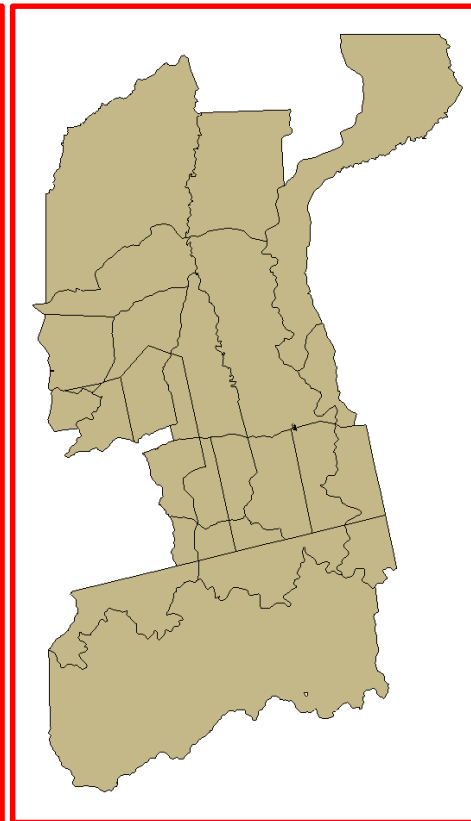
**LINHA**



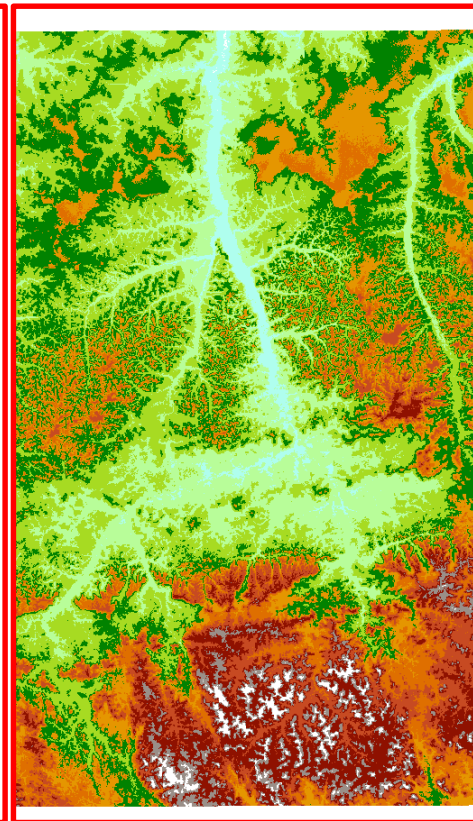
**PONTO**



**POLÍGONO**

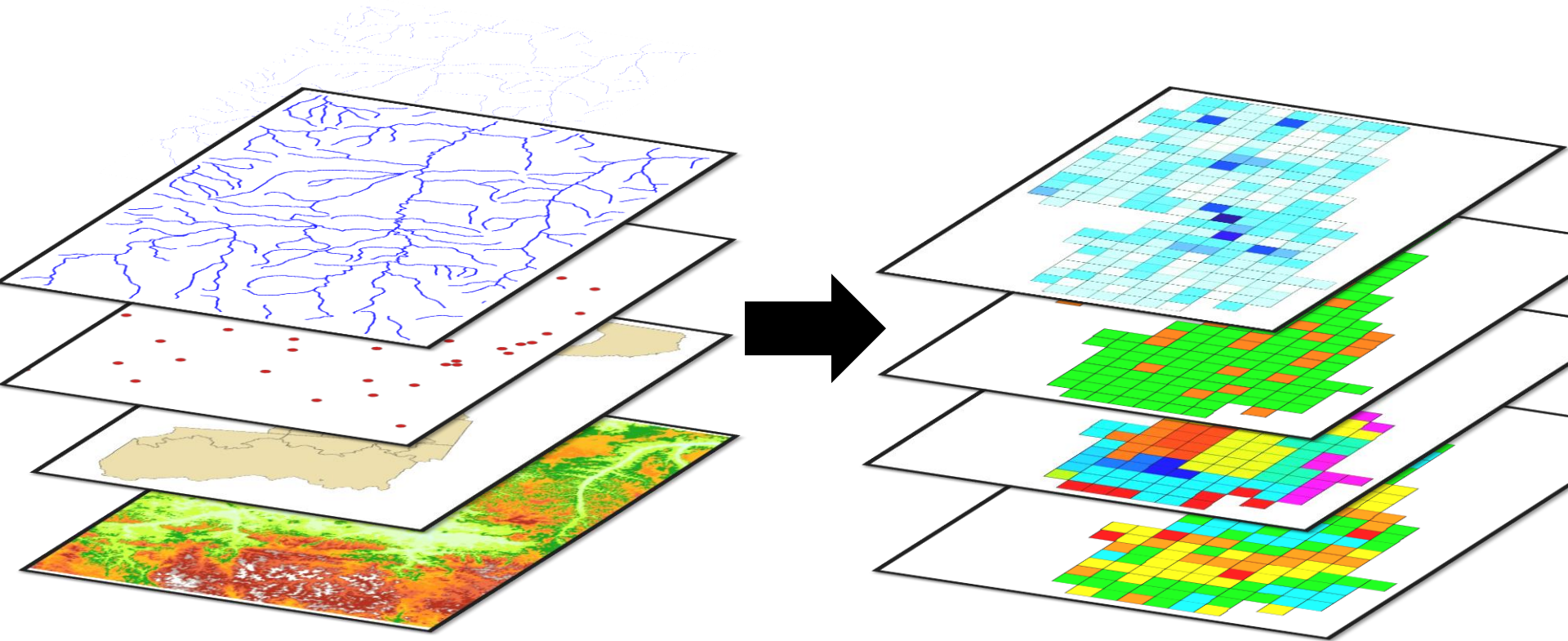


**RASTER**



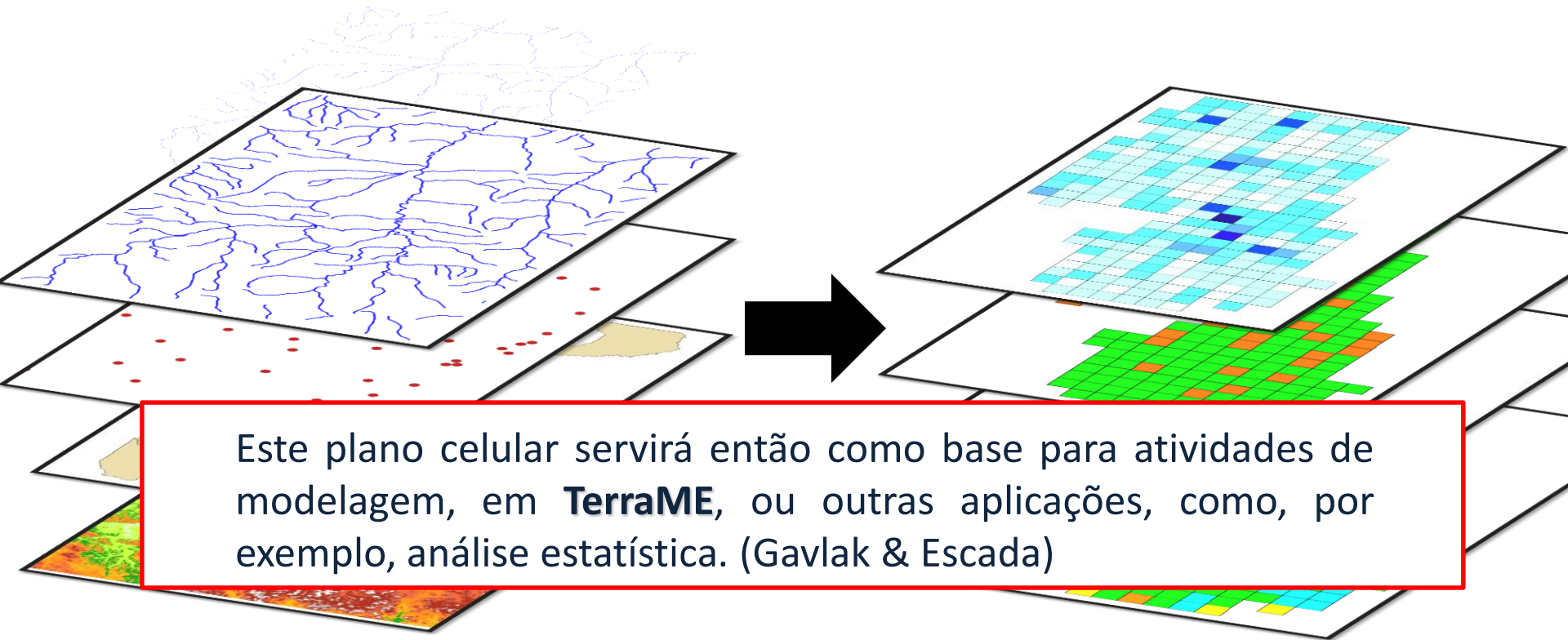
# PREENCHIMENTO DE CÉLULAS

Seu objetivo é homogeneizar informações provenientes de diferentes fontes, em formatos distintos (dados vetoriais, matriciais e também outros planos celulares), agregando-os em uma mesma base espaço-temporal. (Gavlak & Escada)

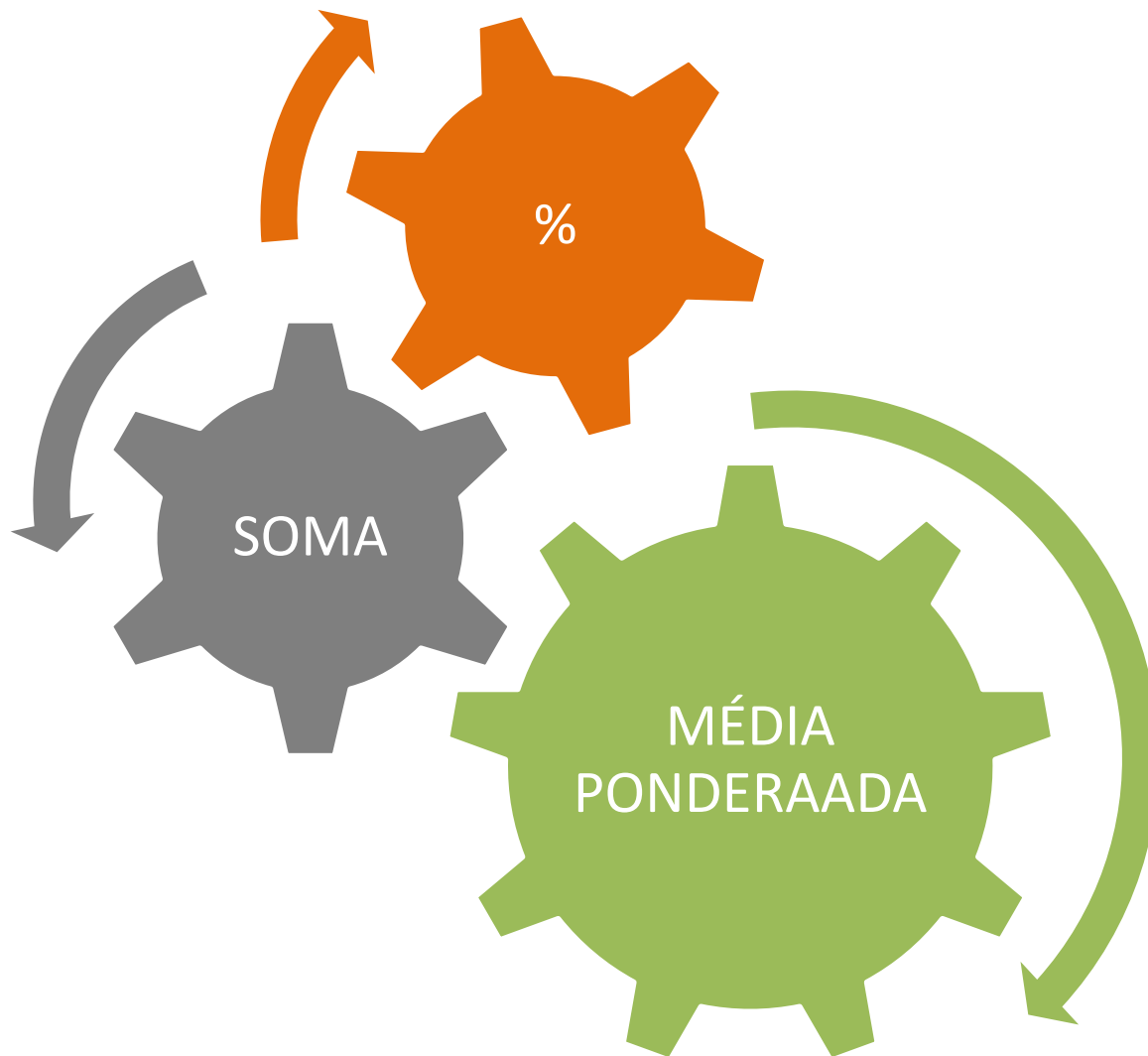


# PREENCHIMENTO DE CÉLULAS

Seu objetivo é homogeneizar informações provenientes de diferentes fontes, em formatos distintos (dados vetoriais, matriciais e também outros planos celulares), agregando-os em uma mesma base espaço-temporal. (Gavlak & Escada)

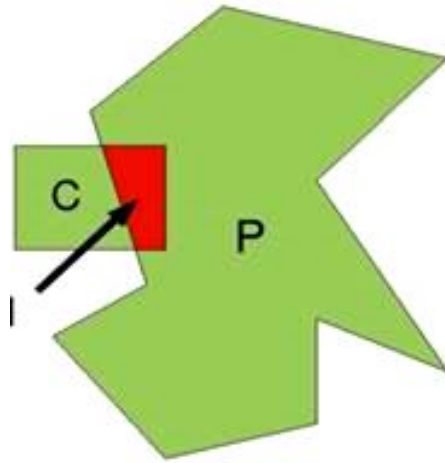


# EXEMPLO DE OPERADORES





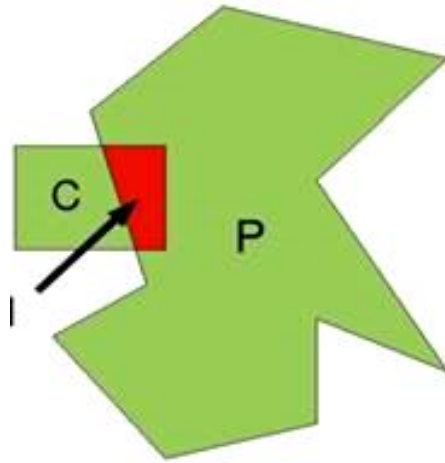
# Soma ponderada por área



$$f(C) = \sum_{I=P \cap C \neq \emptyset} f(P) \frac{a(I)}{a(P)}$$

$f(C)$  é o atributo gerado para a célula  $C$ ,  
 $f(P)$  é o atributo do polígono  $P$ ,  
 $a(I)$  é a área de interseção entre o polígono  $P$  e a célula  $C$ ,  
 $a(P)$  é a área do polígono  $P$ ,

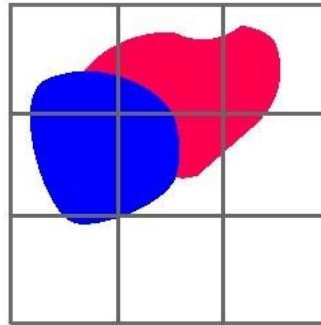
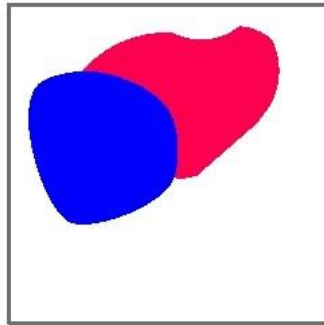
# Média ponderada por área






$$f(C) = \sum_{I=P \cap C \neq \emptyset} f(P) \frac{a(I)}{a(C)}$$

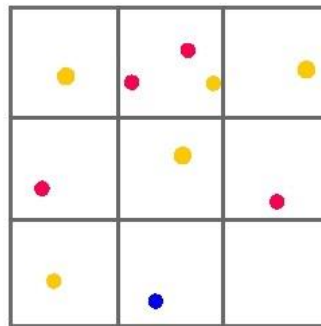
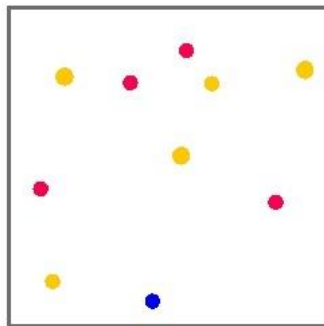
$f(C)$  é o atributo gerado para a célula  $C$ ,  
 $f(P)$  é o atributo do polígono  $P$ ,  
 $a(I)$  é a área de interseção entre o polígono  $P$  e a célula  $C$ ,  
 $a(P)$  é a área do polígono  $P$ ,

# Minimum value (Valor mínimo)



30	30	30
50	30	30
50	0	0

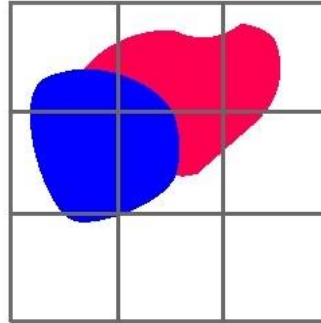
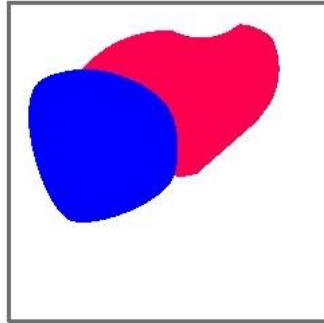
**Valor**  20  30  50



20	20	20
30	20	30
20	50	0



# Maximum value (Valor máximo)

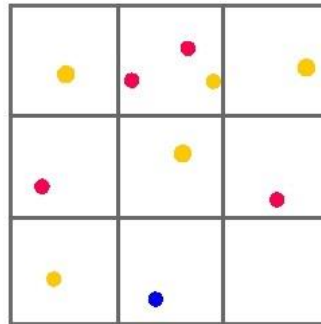
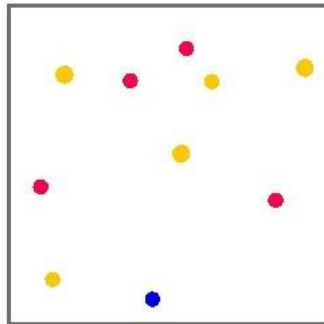


50	50	30
50	50	30
50	0	0

**Valor**  20

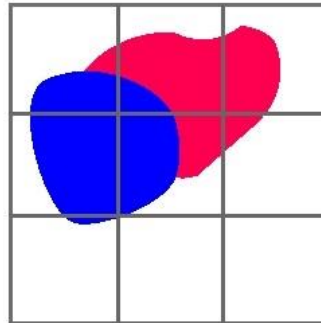
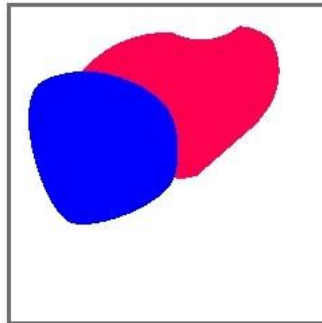
 30

 50



20	30	20
30	20	30
20	50	0

# Mean (Média)

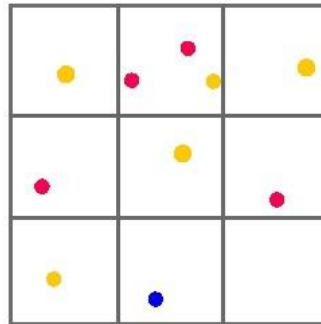
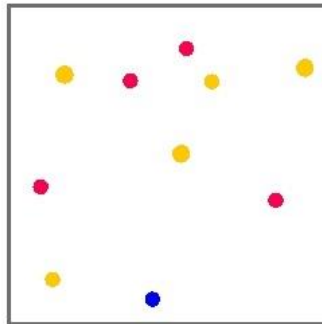


40	40	30
50	40	30
50	0	0

**Valor**  20

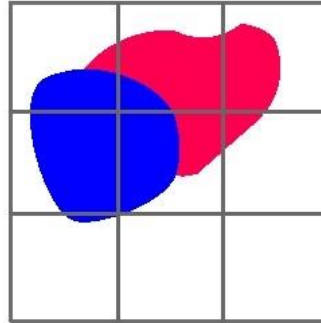
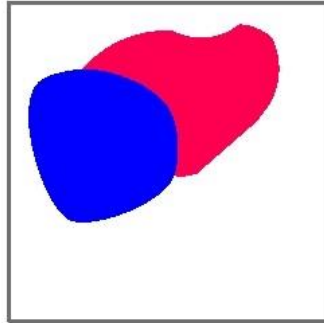
 30

 50



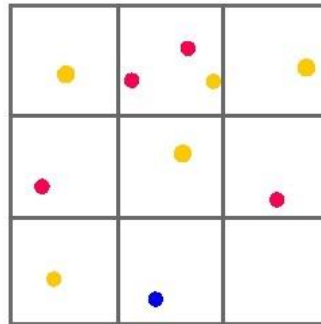
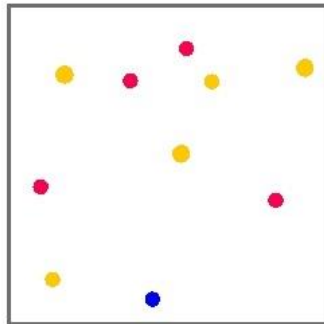
20	26,6	20
30	20	30
20	50	0

# Standard deviation (Desvio padrão)



14,1	14,1	0
14,1	0	0
0		

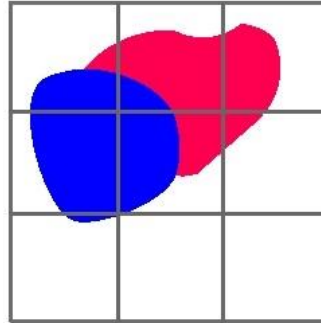
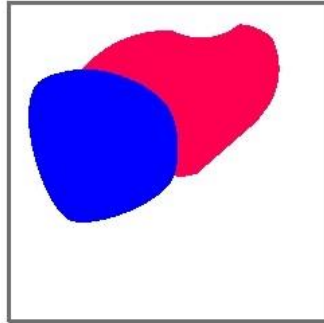
**Valor**  20  30  50



0	5,77	0
0	0	0
0	0	

$$\sigma = \sqrt{\frac{\sum_{i=0}^n (x - x_1)^2}{N}}$$

# Variance (Variância)

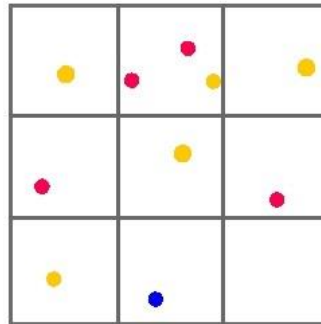
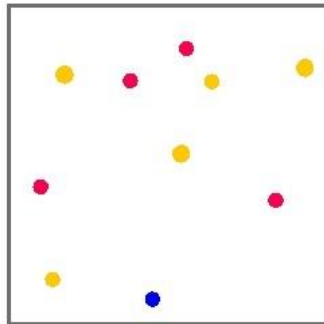


2	2	1
1	2	1
1	0	0

**Valor**  20

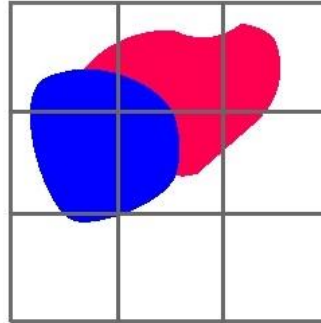
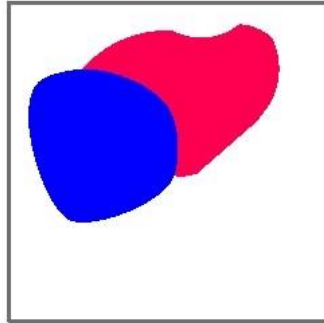
 30

 50



0	33,3	0
0	0	0
0	0	

# Sum of values (Soma dos valores)

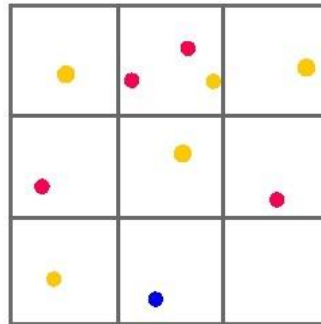
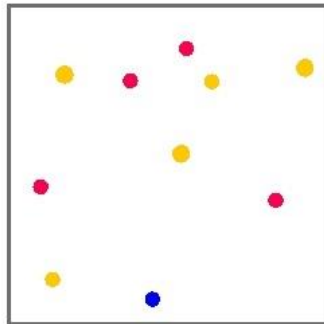


80	80	30
50	80	30
50	0	0

**Valor**  20

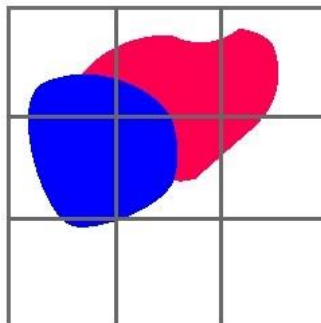
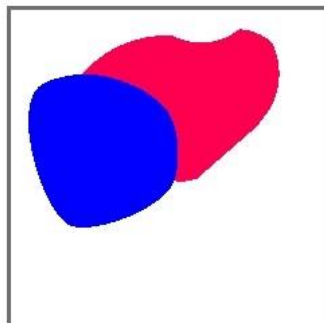
 30

 50



20	80	20
30	20	30
20	50	0

# Presence (Presença)

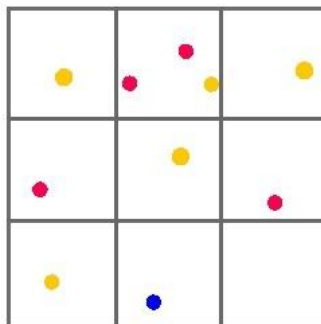
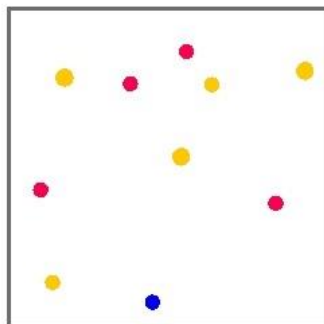


1	1	1
1	1	1
1	0	0

**Valor**  20

 30

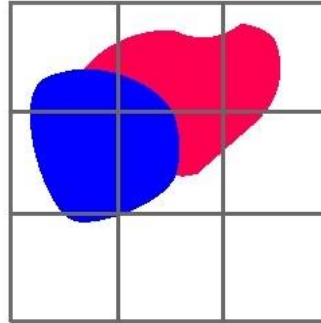
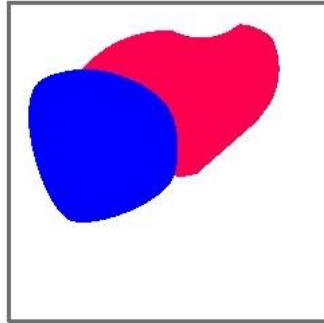
 50



1	1	1
1	1	1
1	1	0



# Total number of values (Contagem)

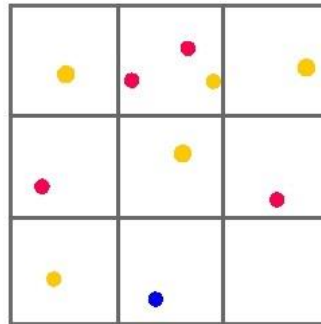
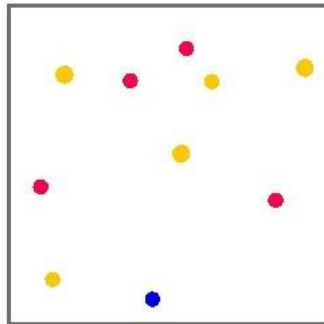


2	2	1
1	2	1
1	0	0

**Valor**  20

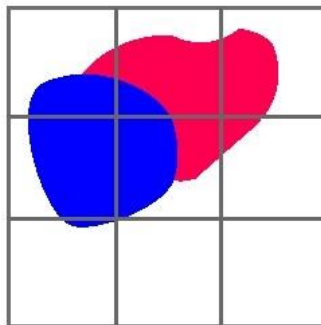
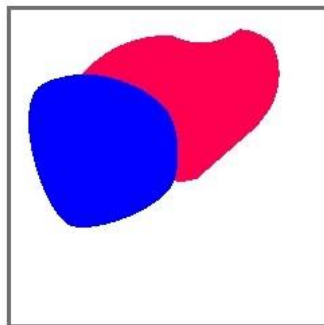
 30

 50



1	3	1
1	1	1
1	1	0

# Classe com maior área de intersecção com a célula

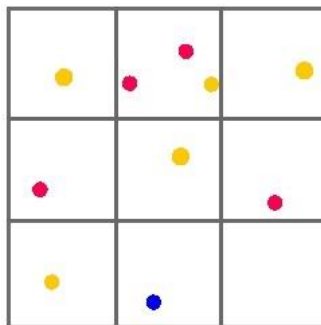
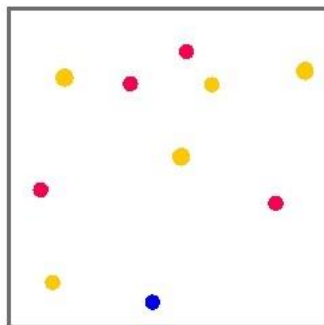


C	B	B
C	C	
C		

Classe  A

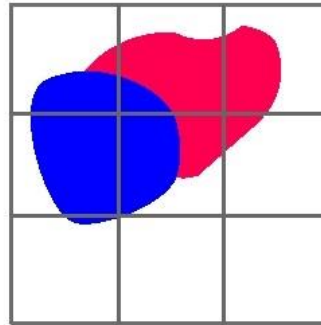
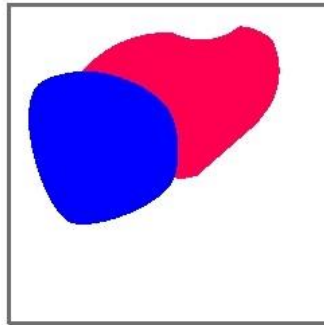
 B

 C



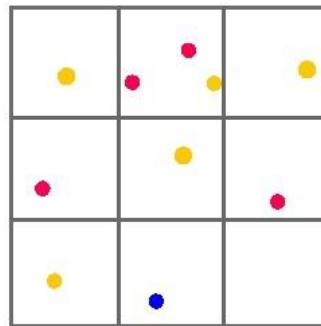
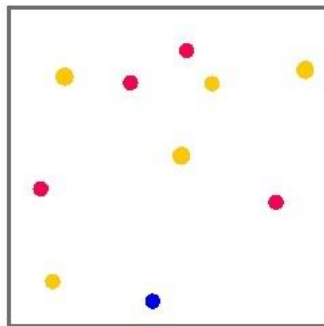
A	B	A
B	A	B
A	C	

# Temático - Percent per class (Percentual por classe)



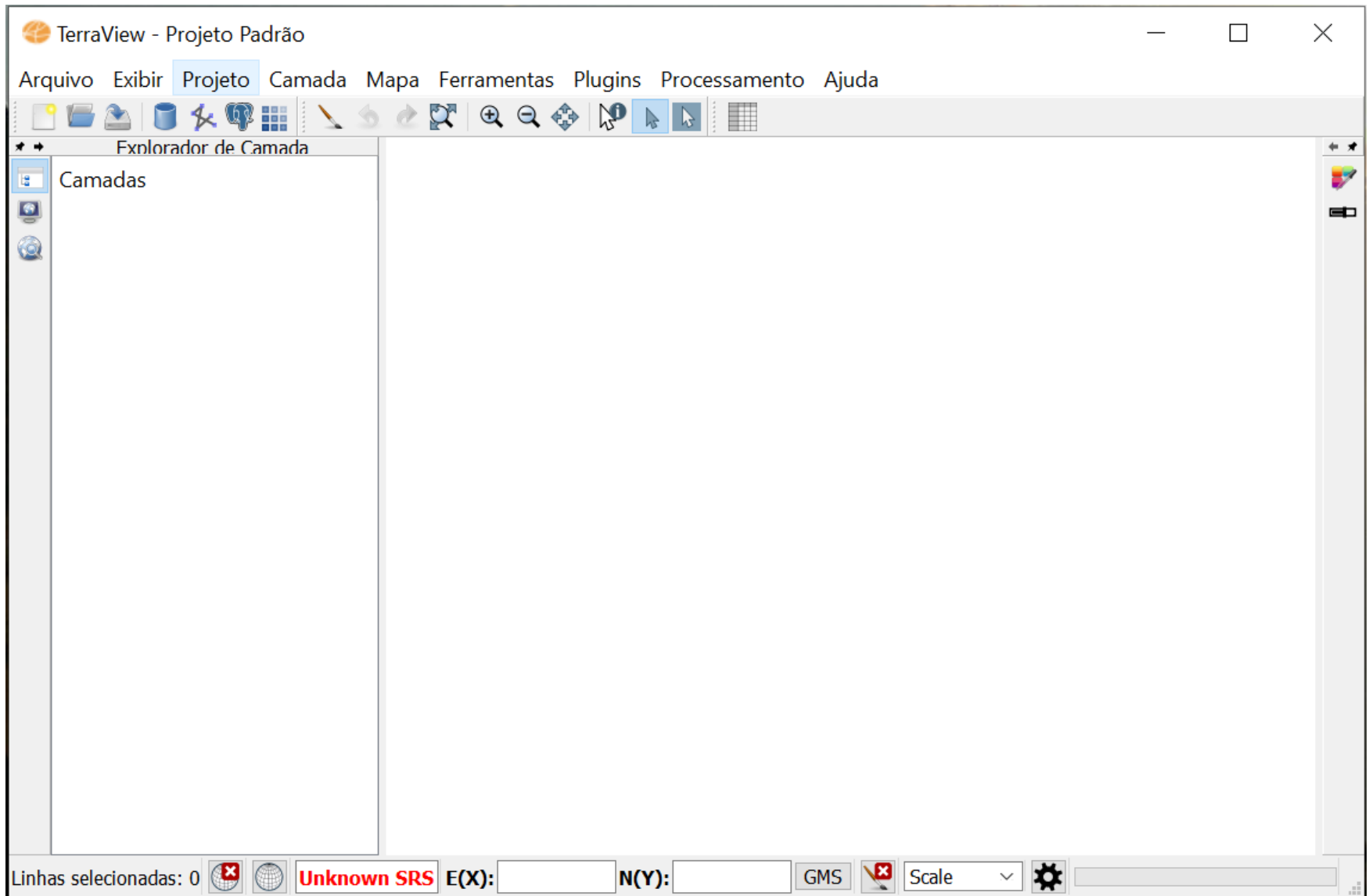
	A	B	C
1		0,048075	0,283516
2		0,606122	0,115566
3		0,379371	0
4			0,704598
5		0,223894	0,469569
6		0,07635	0
7		0	0,007719
8			
9			

Classe  A  B  C



	A	B	C
1	1		
2	0,3333	0,666	
3	1		
4		1	
5	1		
6		1	
7	1		
8			1
9			

# INTERFACE TERRAVIEW 5.X





# IMPORTANTE

1

- Crie um projeto;

2

- Cerifique-se que todos os seus dados estão no mesmo sistema de projeção;

3

- Procure salvar o seu projeto sempre que fizer alterações;

4

- Para o caso de não criar o plano celular no *plugin* e/ou trabalhar com outros polígonos, verificar a geometria dos mesmos.

# IMPORTAR DADOS

The image shows two screenshots of the TerraView 5.2.1 software interface. The top screenshot shows the 'Camada' menu with a red box highlighting the 'Arquivo Vetorial...' option. The bottom screenshot shows the same menu with a red arrow pointing to the 'Arquivo Vetorial...' option. The software title bar reads 'TerraView-5.2.1 - Projeto Padrão \*'. The menu items include 'Adiciona Camada', 'Adicionar Pasta de Camadas...', 'Remove Item(s)', 'Renomear Camada...', 'Propriedades...', 'Arquivo Tabular...', 'Da Fonte de Dados...', 'Dados de Consulta...', 'Arquivo Vetorial...', 'Arquivo Matricial (raster)...', and 'RAW Raster File...'. The bottom status bar shows 'Linhas selecionadas: 0', 'EPSG:32721', and coordinates '(679688.56860, 9633577.56277)'. The number '396184' is also visible in the status bar.

View - Projeto Padrão

Exibir Projeto Camada Mapa Ferramentas Plugins Processing Ajuda

Adiciona Camada  
Adicionar Pasta de Camadas...  
Remove Item(s)  
Renomear Camada... F2  
Propriedades...

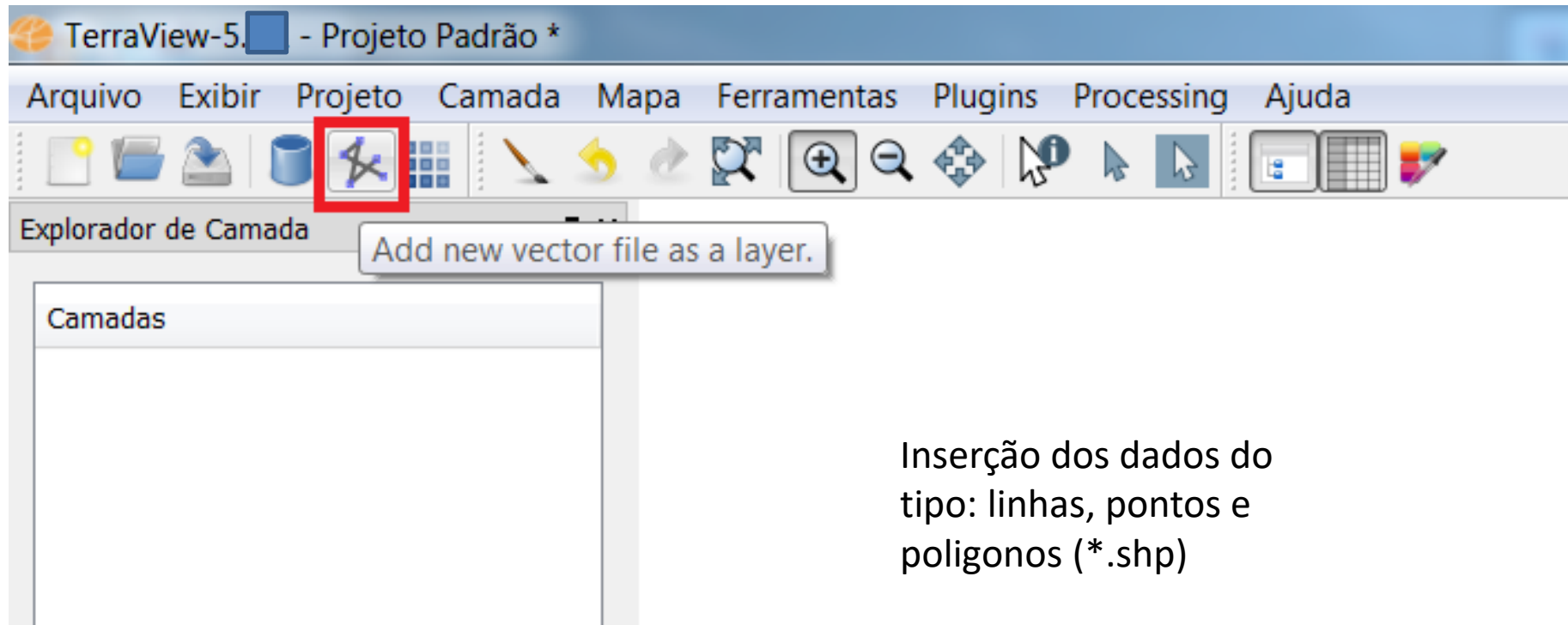
Arquivo Tabular...  
Da Fonte de Dados...  
Dados de Consulta...  
Arquivo Vetorial...  
Arquivo Matricial (raster)...  
RAW Raster File...

Inserção dos dados do tipo: linhas, pontos e poligonos (\*.shp)

Linhas selecionadas: 0 EPSG:32721 (679688.56860, 9633577.56277) 396184

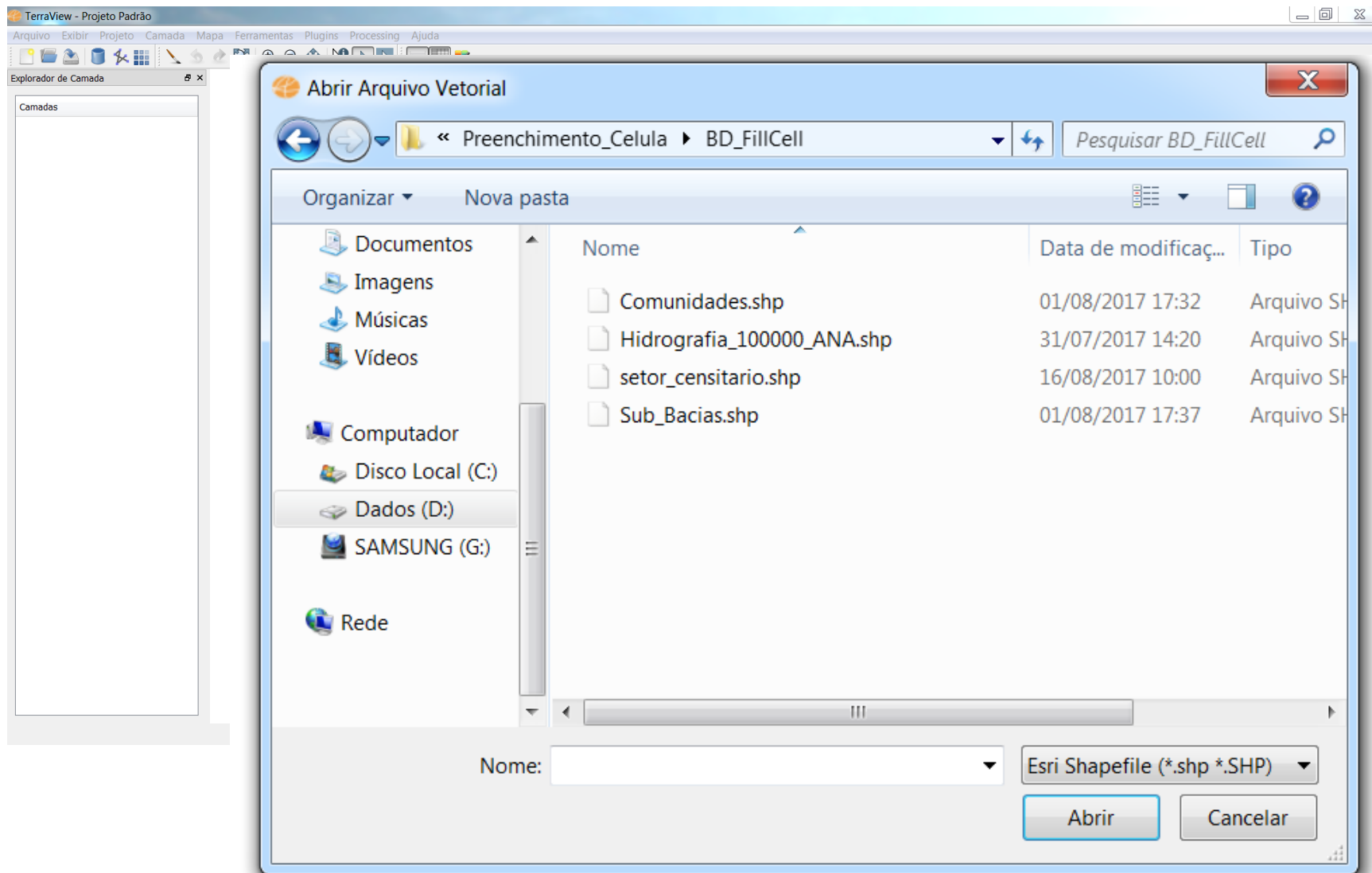


# IMPORTAR DADOS

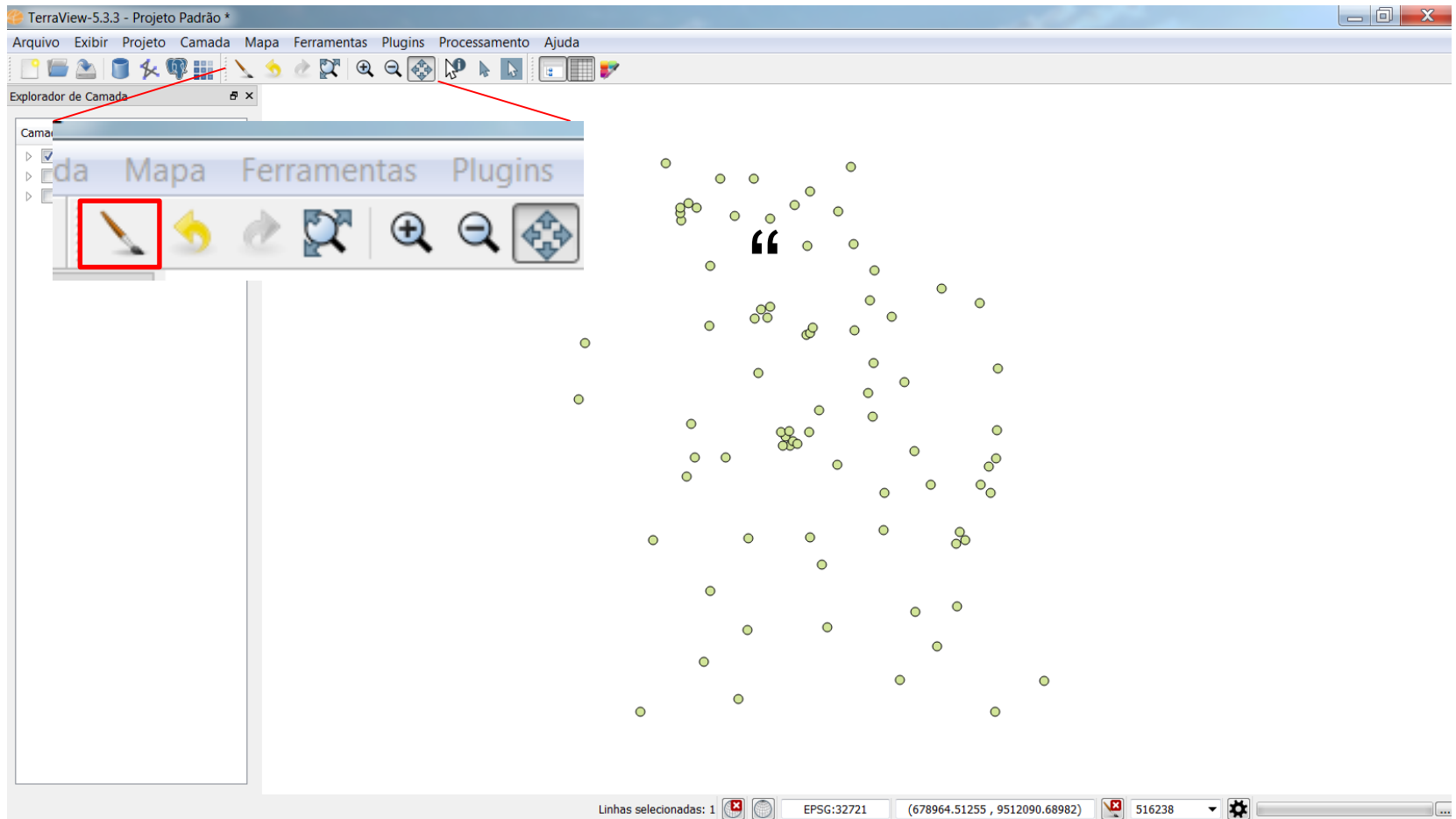


Inserção dos dados do tipo: linhas, pontos e polígonos (\*.shp)

# IMPORTAR DADOS



# “DESENHAR” OS DADOS



# REPRESENTAÇÃO VISUAL DOS *LAYERS*

Arquivo Exibir Projeto Camada Mapa Ferramentas Plugins Processamento Ajuda

Explorador de Camada

Camadas

- Comunidades
  - Estilo**
  - Hidrografia\_100000\_ANA
  - Sub\_Bacias

Duplo clique, para editar o símbolo

Style Explorer

Estilo

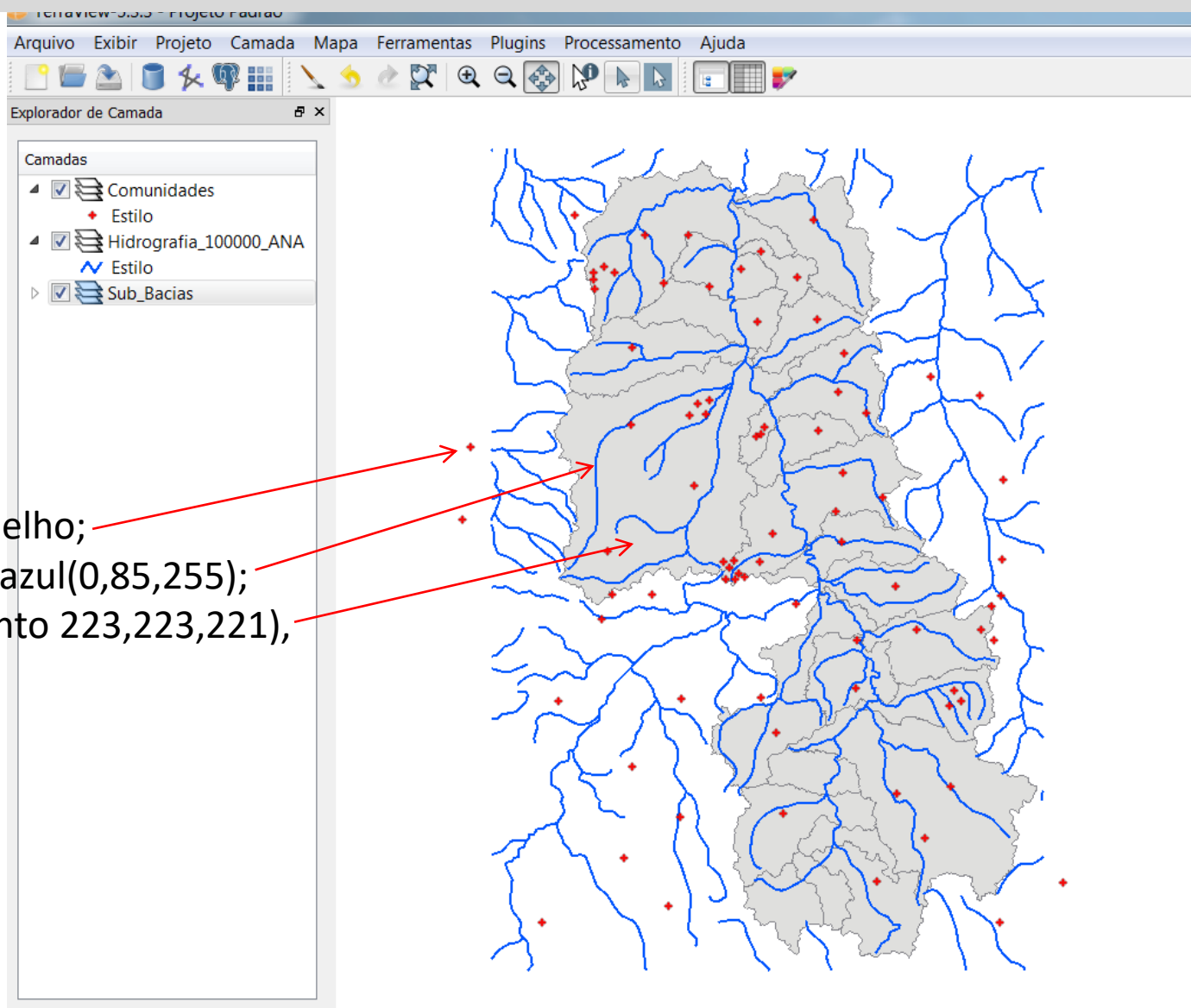
- Regra
  - Símbolo de Ponto 0

Graphic Properties

Propriedade	Valor
Gráfico	
Tamanho	12.00
Ângulo	0.00
Opacidade	100

Linhas selecionadas: 1 EPSG:32721 (719978.15887, 9585933.44106) 517703

# REPRESENTAÇÃO VISUAL DOS *LAYERS*

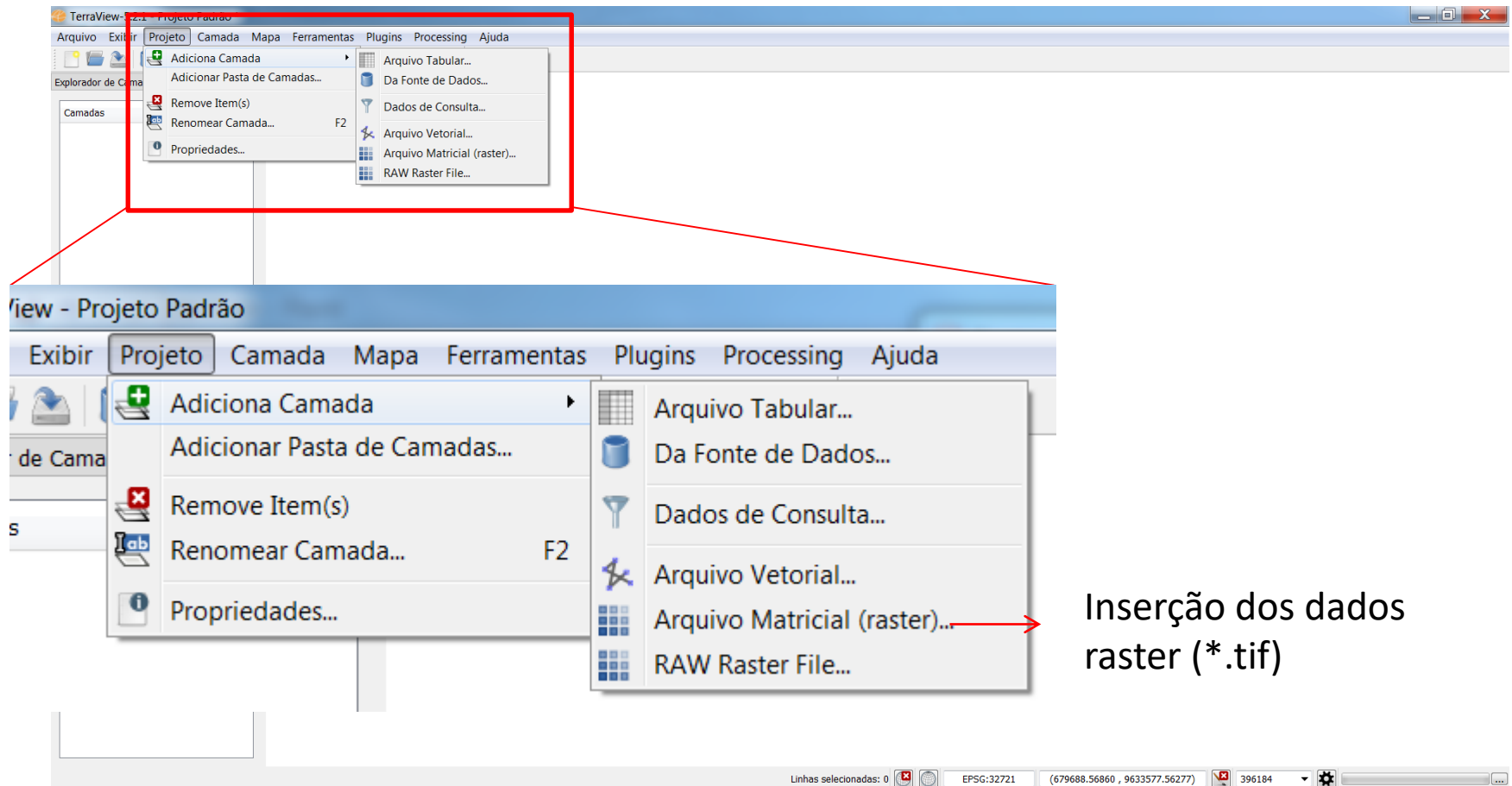


**Comunidade:** cruz, vermelho;

**Hidrografia:** largura 2.5, azul(0,85,255);

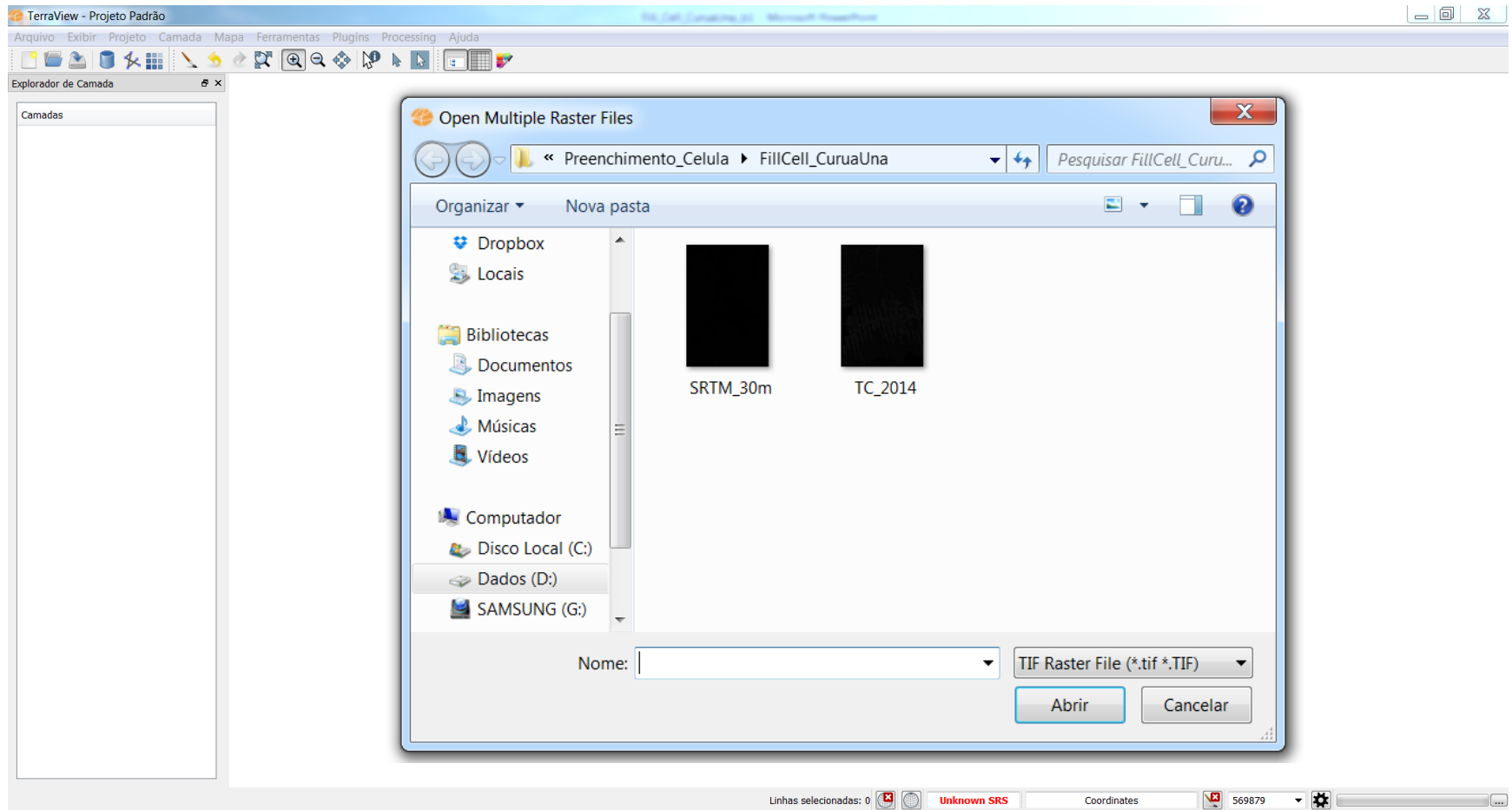
**Sub-Bacias:** Preenchimento 223,223,221),  
linha 1 (130,130,136)

# IMPORTAR DADOS

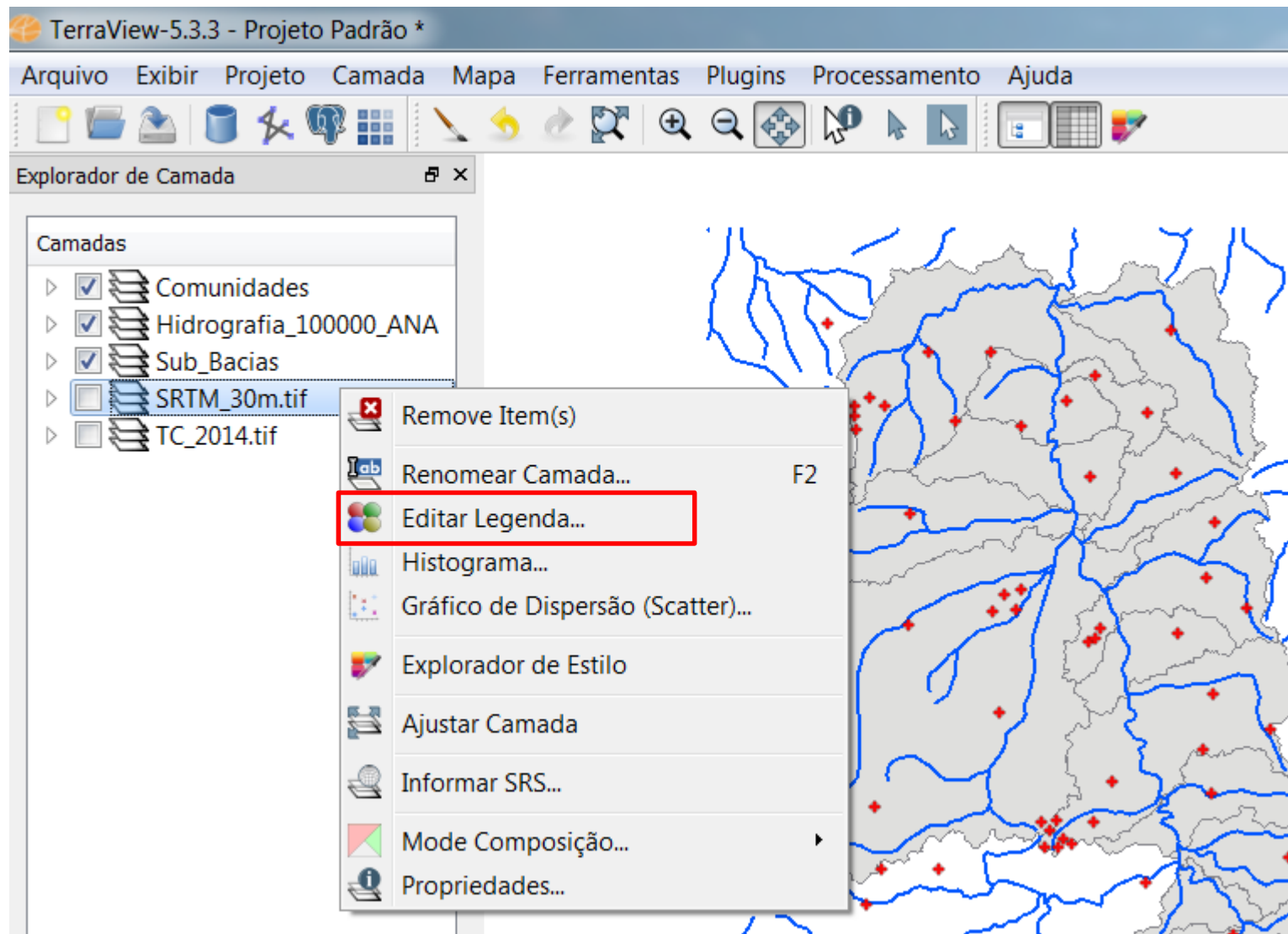




# IMPORTAR DADOS



# REPRESENTAÇÃO VISUAL DOS *LAYERS*



# REPRESENTAÇÃO VISUAL DOS *LAYERS*

The image shows the TerraView-5.3.3 software interface. On the left, the 'Explorador de Camada' (Layer Explorer) shows a list of layers: Comunidades, Hidrografia\_100000\_ANA, Sub\_Bacias, SRTM\_30m.tif (selected), Estilo, and TC\_2014.tif. The main window displays the 'Editar Legenda (Camada:SRTM\_30m.tif)' dialog box. This dialog is titled 'Esta operação cria uma legenda em uma camada selecionada' and contains the following settings:

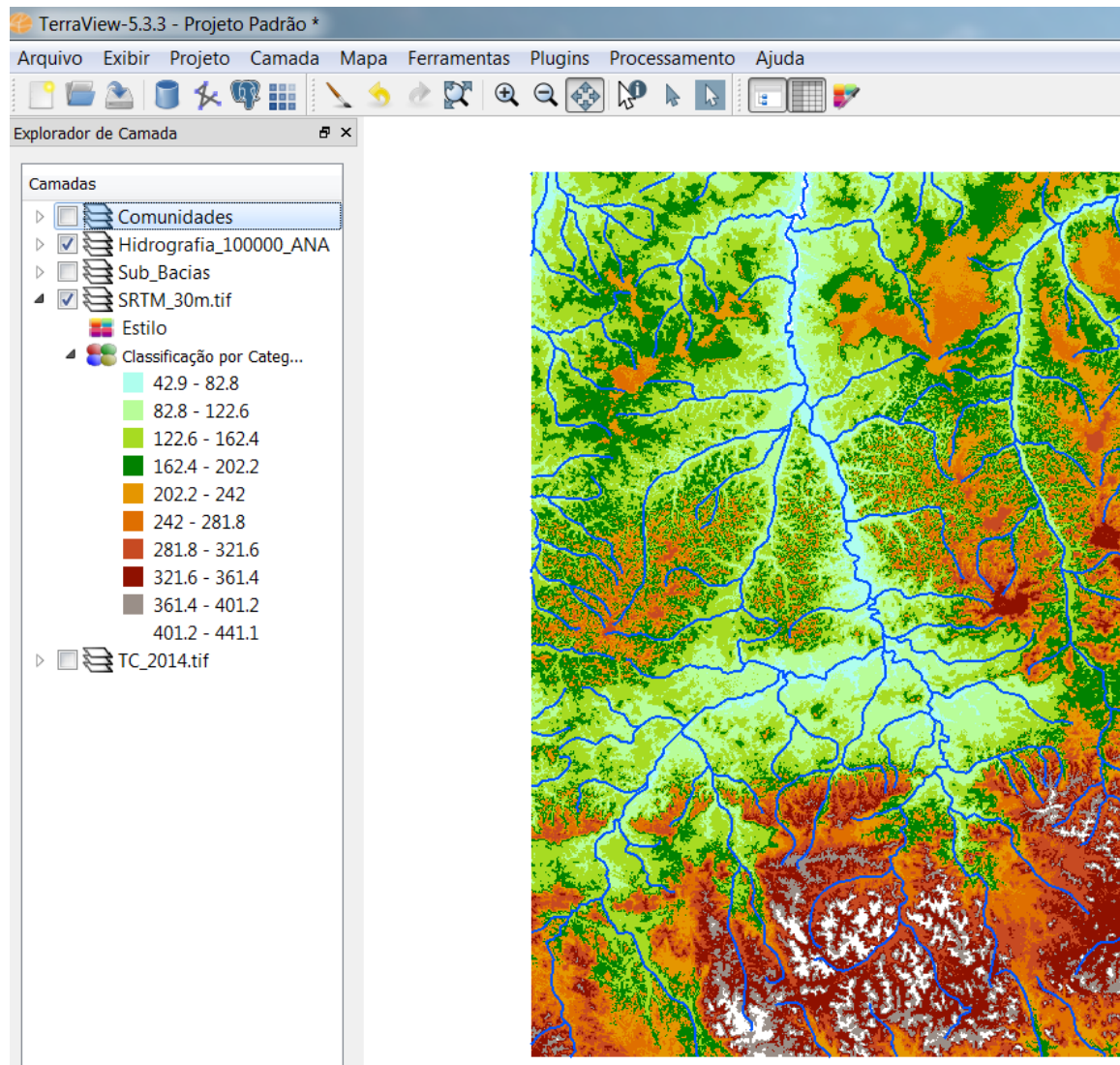
- Importar Camada Agrupada
- Camada: [dropdown] Importar
- Parâmetros:
  - Banda: 0
  - Valor Mínimo: 43
  - Valor Máximo: 441
- Transformação: Categorizar
- Passos: 10
- Tipo: Passo Igual
- Precisão: 1
- Barra de Cor: [color bar]
- Usar Esquema
- Catálogo: Default
- Grupo: Classification
- Esquema: Altimetry Wet
- Aplicar

On the right side of the dialog, the 'Mapa de Cor' (Color Map) table is displayed:

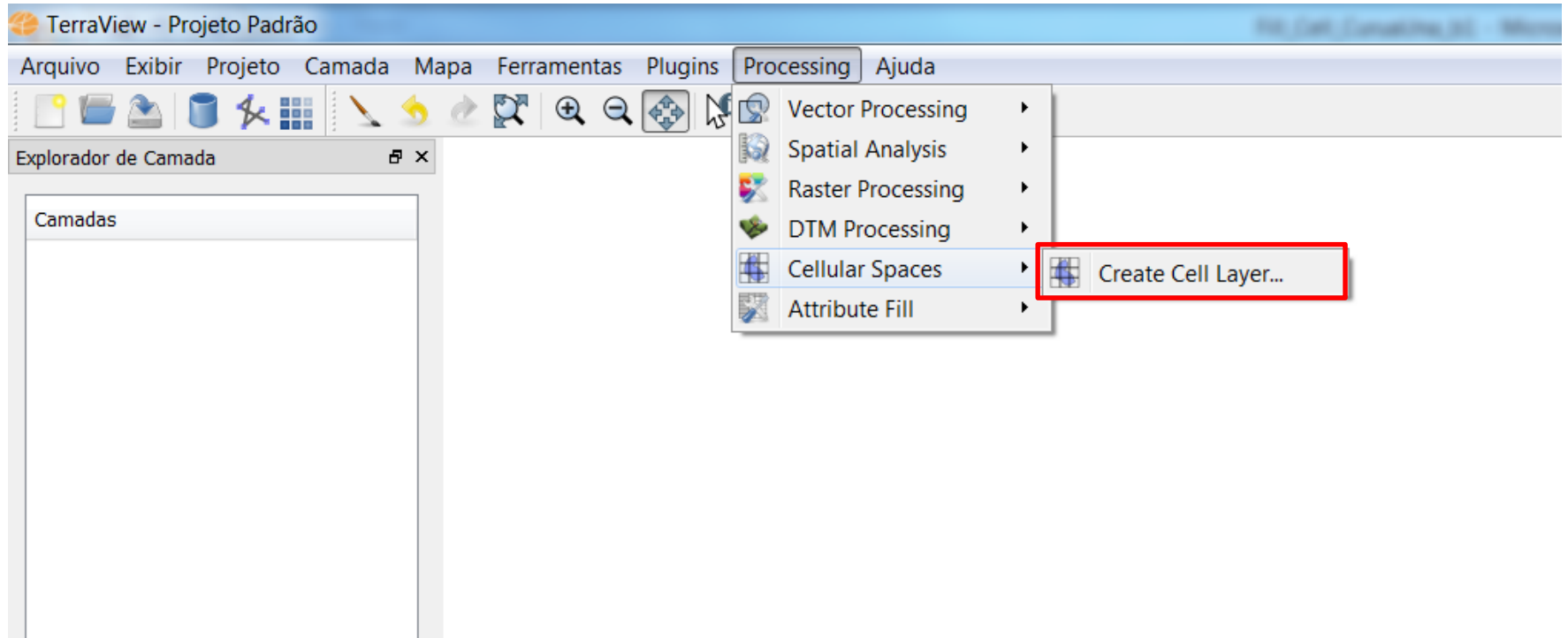
	Cor	De	Para
1	[light blue]	42.9	82.8
2	[light green]	82.8	122.6
3	[medium green]	122.6	162.4
4	[dark green]	162.4	202.2
5	[yellow-green]	202.2	242.0
6	[yellow]	242.0	281.8
7	[orange]	281.8	321.6
8	[red-orange]	321.6	361.4
9	[red]	361.4	401.2
10	[white]	401.2	441.1

Buttons at the bottom of the dialog include 'Ajuda', 'Ok', and 'Cancela'. A partial map view is visible at the bottom of the screen.

# REPRESENTAÇÃO VISUAL DOS *LAYERS*



# CRIAÇÃO DO PLANO CELULAR



# CRIAÇÃO DO PLANO CELULAR

**Cria Camada como Espaço Celular**

Entrada: Sub\_Bacias  
SRS: WGS 84 / UTM zone 21S

Máscara:   Tipo:

Parâmetros

Retângulo Envolvente: SRS: WGS 84 / UTM zone 21S  
LL(x): 752686.91 UR(x): 827820.77  
LL(y): 9522597.96 UR(y): 9646443.20

Dimensão: Unidade Res: METRE  
Res X:   
Res. Y:   
Cols:   
Linhas:

Saída

Repositório:

Nome da Camada:

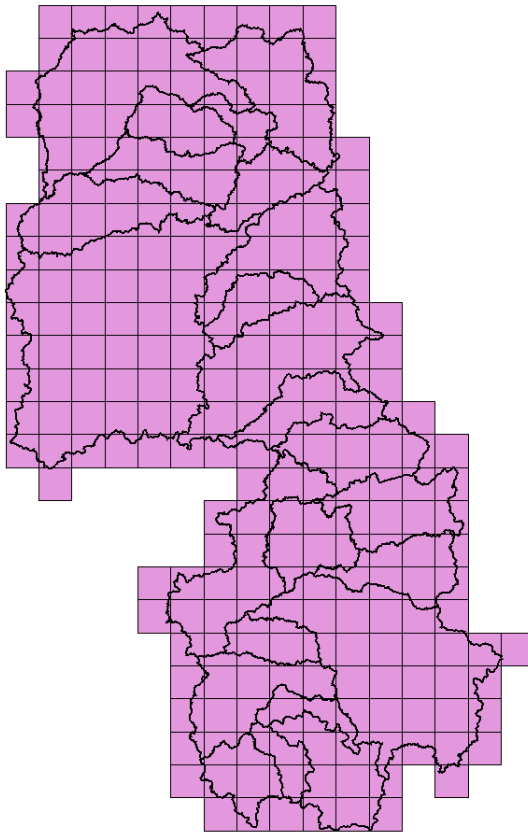
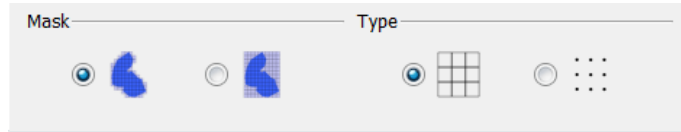
Ajuda Criar Cancela

Resolução 5 km

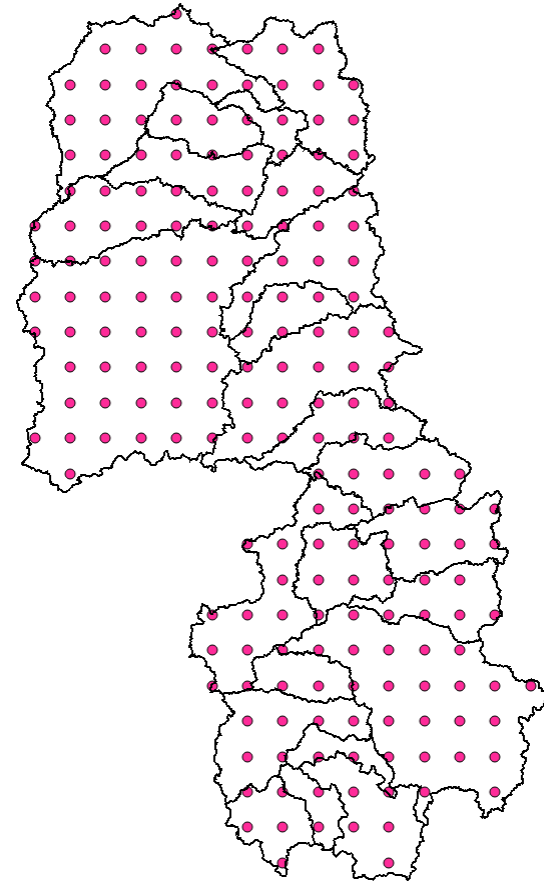
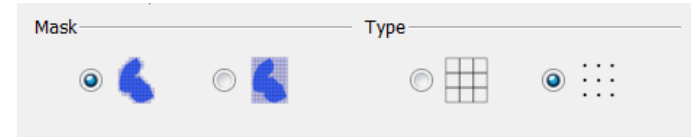
(660594.76409 , 9651409.77221) 516238



# CRIAÇÃO DO PLANO CELULAR

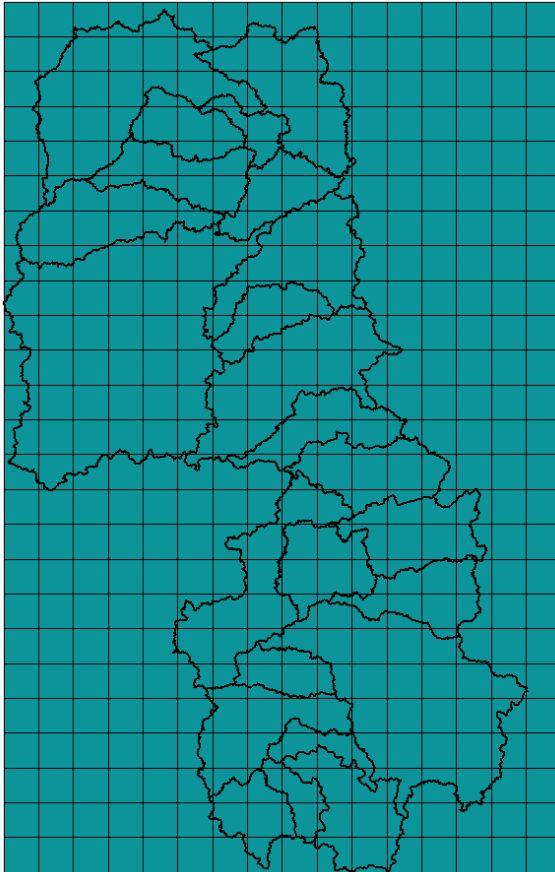
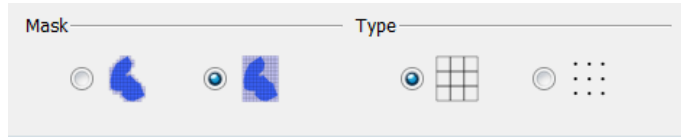


Mask (células)

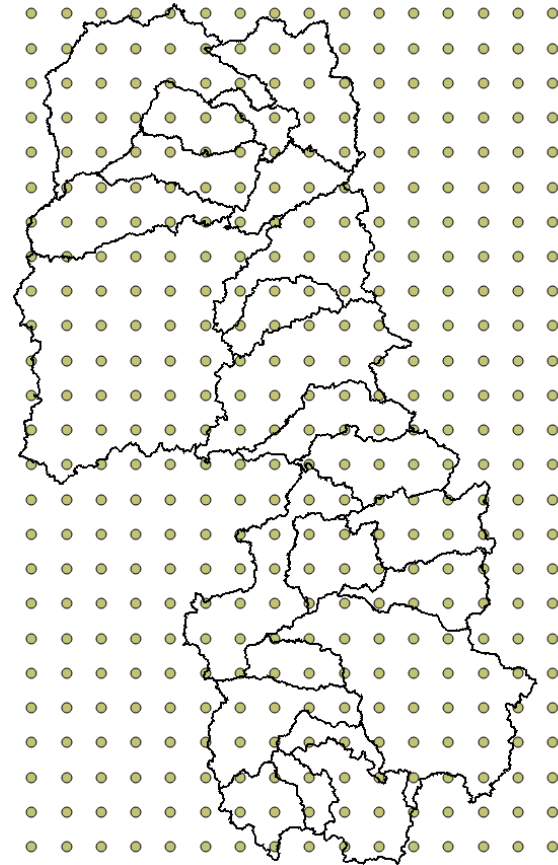
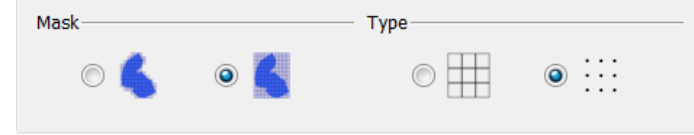


Mask (centróides)

# CRIAÇÃO DO PLANO CELULAR

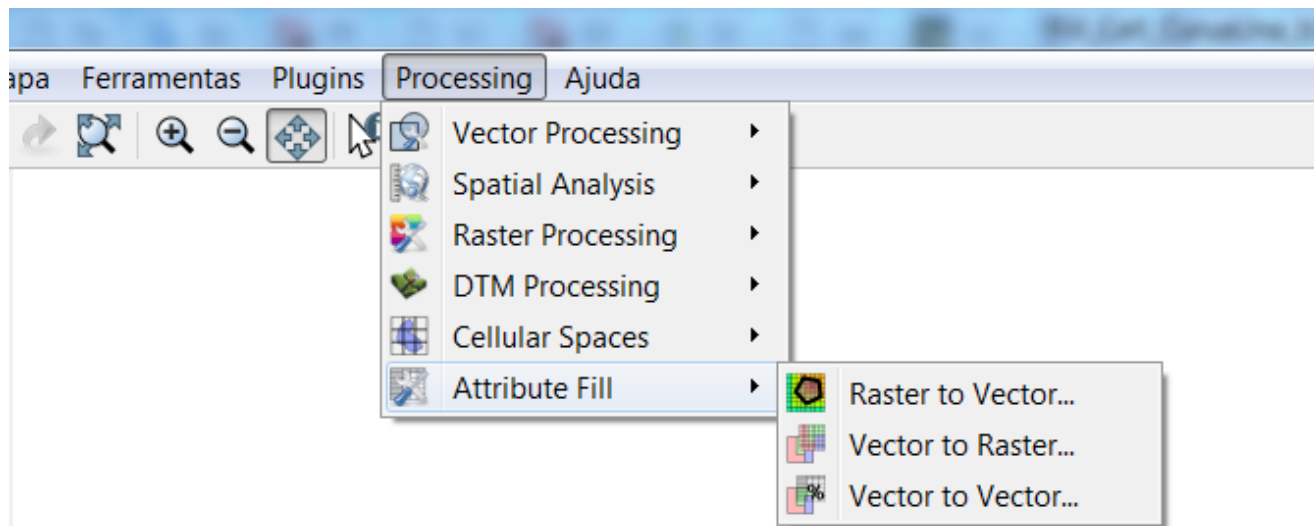


Mask (células)



Mask (centróides)

# PREENCHIMENTO CELULAR



**Raster to Vector** – Extraí os atributos do raster através de operador(es) para um plano celular (ou polígonos irregulares).

**Vector to Rater** – Cria um raster baseado nos valores do atributo escolhido.

**Vector to Vector** – Extraí os atributos da camada (ponto, linha, polígono) através de operadores para um plano celular (ou polígonos irregulares).

# OPERAÇÕES DO PREENCHIMENTO CELULAR

Operation	Data Type*	Polygons	Lines	Points
Value	If only one relationship: "From" attribute type More than one: I-R-S	X	X	X
Minimum value (Valor mínimo)	I-R-S	X	X	X
Maximum value (Valor máximo)	I-R-S	X	X	X
Mean (Média)	I-R	X	X	X
Sum of values (Soma dos valores)	I-R	X	X	X
Total number of values (Número total de valores)	I-R-S	X	X	X
Total not null values (Número total de valores nulos)	I-R-S	X	X	X
Standard deviation (Desvio padrão)	I-R	X	X	X
Variance (Variância)	I-R	X	X	X
Skewness	I-R	X	X	X
Kurtosis (Curtosi)	I-R	X	X	X
Amplitude	I-R	X	X	X
Median (Mediana)	I-R	X	X	X
Coefficient variation (Coeficiente de variação)	I-R	X	X	X
Mode (Moda)	I-R-S	X	X	X

# OPERAÇÕES DO PREENCHIMENTO CELULAR

Operation	Data Type*	Polygons	Lines	Points
Value	If only one relationship: "From" attribute type More than one: I-R-S	X	X	X
Class with highest occurrence (Classe com maior ocorrência)	I-S	X	X	X
Class with highest intersection area (Classe com maior intersecção)	I-S	X	-	-
Percent per class (Percentual por classe)	I-S	X	-	-
Minimum distance (Distância mínima)	I-R-S	X	X	X
Presence (Presença)	I-R-S	X	X	X
Weighted by area (Média ponderada por área)	I-R	X	-	-
Weighted sum by area (Soma ponderada por área)	I-R	X	-	-
Percent of each class by area (Percentual de classe por área)	I-S	X	-	-
Percent of total area (Percentual por área total)	I-R	X	-	-

\* S = String; R = Real; I = Integer.

# HIDROGRAFIA (LINHA)

- Presença de rios na célula (Presence);
- Distância dos rios da célula (Minimum distance);
- Densidade de drenagem por célula (Total number of values).

# HIDROGRAFIA (LINHA)

The image displays two overlapping dialog boxes in a GIS application. The background shows a map with a grid and blue lines representing hydrography.

**Vector To Vector Dialog:**

- Spatial operations between two layers:** Includes a percentage icon and a grid icon.
- Input:**
  - From Layer: Hidrografia\_100000\_ANA
  - To Layer: Cell\_5km\_11
  - Select attributes... button
- Spatial Relation:**
  - Inside (radio button)
  - Inside Or Covered By (radio button)
  - Intercepts (radio button)**
  - Crosses (radio button)
- Output:** A red box highlights the Repository and Layer Name fields.
- Operation:**
  - Select all: (dropdown)
  - Reject all: (dropdown)
  - List of operations: FID : Mean, FID : Sum of values, FID : Total number of values, FID : Total not null values, FID : Standard deviation, FID : Variance, FID : Skewness, FID : Kurtosis, FID : Amplitude, FID : Median, FID : Coefficient variation, FID : Mode, FID : Class with highest occurrence, FID : Minimum Distance, FID : Minimum Distance From Centroid, FID : Presence.
- Buttons: Help, Ok, Cancel.

**Save as... Dialog:**

- Path: Computador > Dados (D:) > Preenchimento\_Celula > FillCell\_CuruaUna
- Organizar: Nova pasta
- Left sidebar: Locais, Bibliotecas, Documentos, Imagens, Músicas, Vídeos, Computador, Disco Local (C:), Dados (D:), SAMSUNG (G:).
- Files: Cell\_5km\_11.shp, Cell\_5km\_12.shp, Cell\_5km\_21.shp, Cell\_5km\_22.shp, Comunidades.shp, Hidrografia.shp, Hidrografia\_100000\_ANA.shp, Sub\_Bacias.shp.
- Nome: (empty field)
- Tipo: Shapefile (\*.shp \*.SHP)
- Buttons: Salvar, Cancelar.

# HIDROGRAFIA (LINHA)

The screenshot displays the TerraView 5.2.1 interface. The main window shows a map with a green grid overlay and blue lines representing hydrography. The layer explorer on the left lists various layers, with 'Fill\_hidrografia' selected. The data table at the bottom provides details for the selected layer.

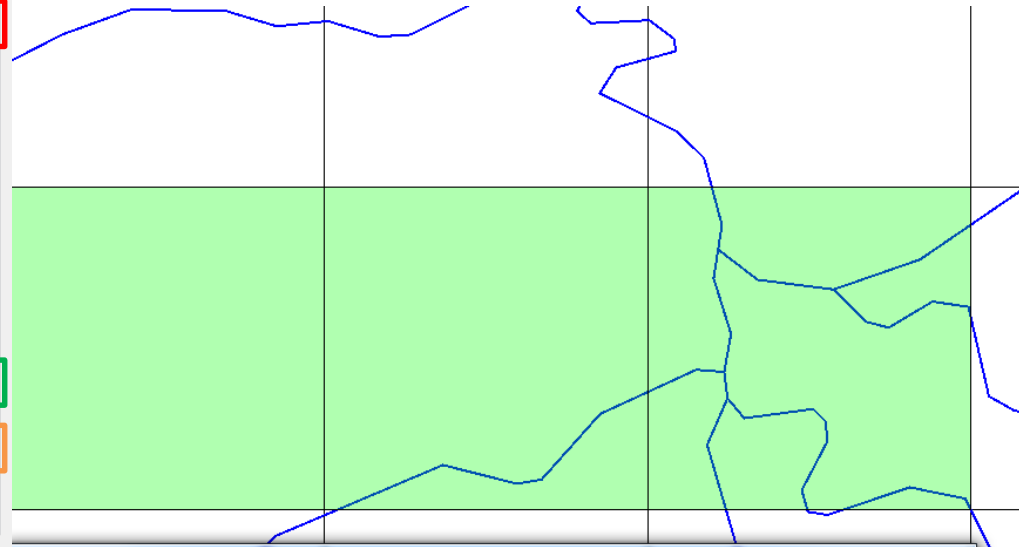
FID	id	col	row	fid_total_	fid_min_di	fid_presen
31	C11L03	11	3	1.000000	0.000000	1
32	C12L03	12	3	0.000000	2510.374597	0
33	C13L03	13	3	1.000000	0.000000	1
34	C14L03	14	3	1.000000	0.000000	1
35	C05L04	5	4	0.000000	1050.993276	0
36	C06L04	6	4	1.000000	0.000000	1
37	C07L04	7	4	1.000000	0.000000	1

Linhas selecionadas: 1 | EPSG:32721 | (912552.06951, 9540803.09864) | 414324 | terça-feira, 1 de agosto de 2017



# HIDROGRAFIA (LINHA)

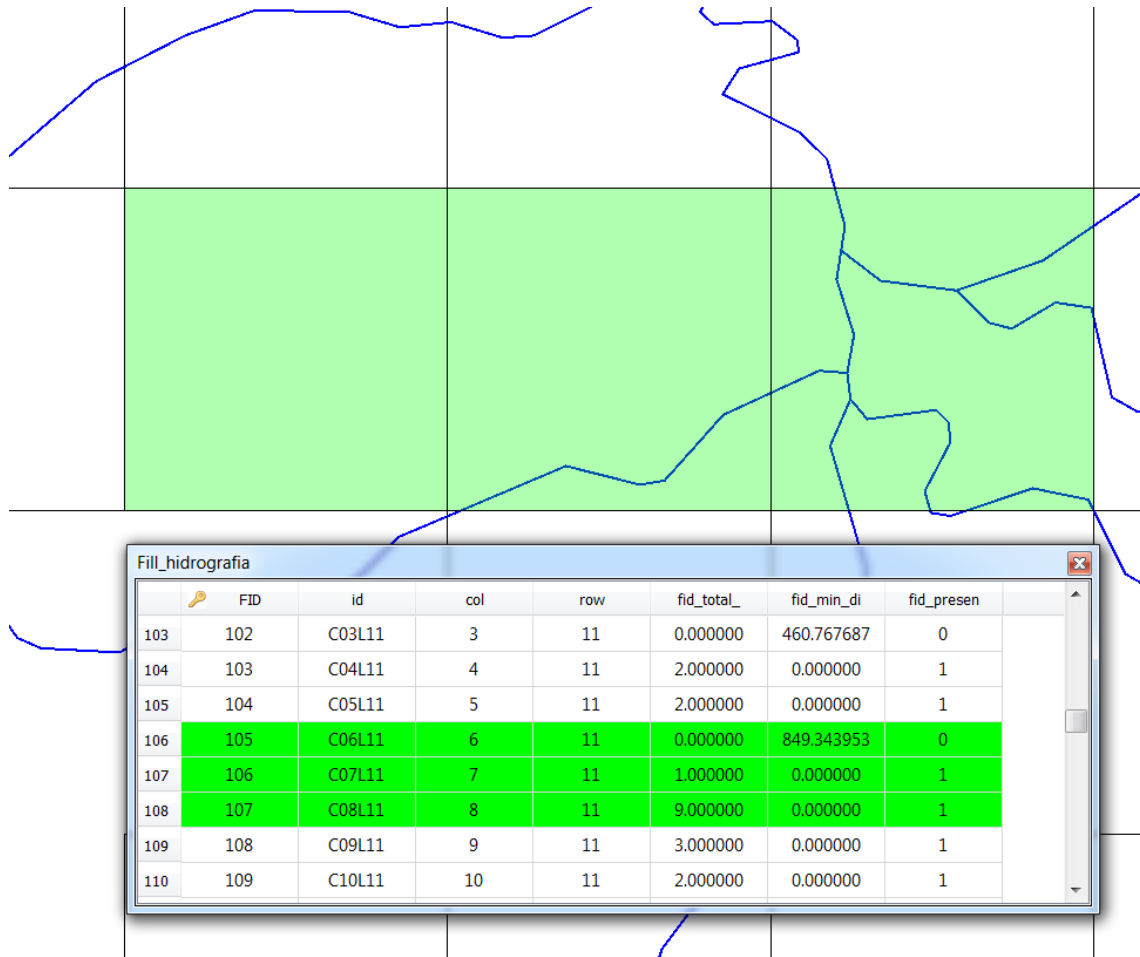
- FID : Mean
- FID : Sum of values
- FID : Total number of values
- FID : Total not null values
- FID : Standard deviation
- FID : Variance
- FID : Skewness
- FID : Kurtosis
- FID : Amplitude
- FID : Median
- FID : Coefficient variation
- FID : Mode
- FID : Class with highest occurrence
- FID : Minimum Distance
- FID : Minimum Distance From Centroid
- FID : Presence



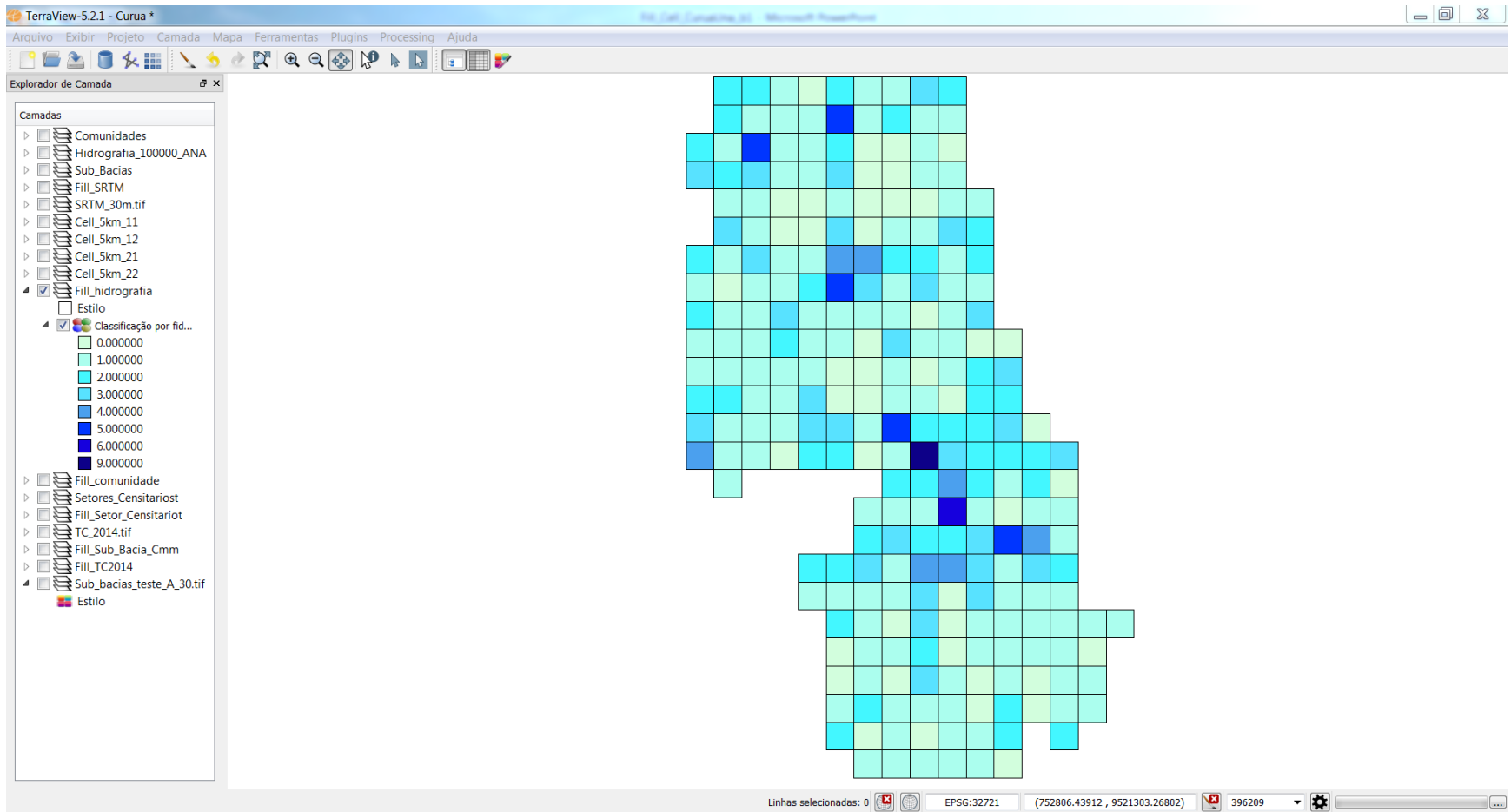
Fill\_hidrografia

	FID	id	col	row	fid_total_	fid_min_di	fid_presen
103	102	C03L11	3	11	0.000000	460.767687	0
104	103	C04L11	4	11	2.000000	0.000000	1
105	104	C05L11	5	11	2.000000	0.000000	1
106	105	C06L11	6	11	0.000000	849.343953	0
107	106	C07L11	7	11	1.000000	0.000000	1
108	107	C08L11	8	11	9.000000	0.000000	1
109	108	C09L11	9	11	3.000000	0.000000	1
110	109	C10L11	10	11	2.000000	0.000000	1

# HIDROGRAFIA (LINHA)



# HIDROGRAFIA (LINHA)



Densidade de drenagem por célula

# COMUNIDADES (PONTO)

- Densidade (Total number of values);
- Presença (Presence);
- População:
  - Somatório (Sum of values);
  - Média (Mean);
  - Máximo (Maximum value);
  - Mínimo (Minimum value).

# COMUNIDADES (PONTO)

The image displays the TerraView 5.2.1 interface with two dialog boxes open over a map. The map shows a grid of cells with a pink shaded area and several black dots representing points.

**Vector To Vector Dialog:**


- Spatial operations between two layers:**
- Input:**
  - From Layer: Comunidades
  - To Layer: Cell\_5km\_11
- Operation:**
  - Select all: (empty)
  - Reject all: (empty)
  - FID : Sum of values
  - FID : Total number of values
  - FID : Total not null values
  - FID : Standard deviation
  - FID : Variance
  - FID : Skewness
  - FID : Kurtosis
  - FID : Amplitude
  - FID : Median
  - FID : Coefficient variation
  - FID : Mode
  - FID : Class with highest occurrence
  - FID : Minimum Distance
- Spatial Relation:**
  - Inside
  - Inside Or Covered By
  - Intercepts
  - Crosses
- Output:**
  - Repository: (empty)
  - Layer Name: (empty)

**Save as... Dialog:**

- Location: Computador > Dados (D:) > Preenchimento\_Celula > FillCell\_CuruaUna
- Files in directory:
  - Cell\_5km\_11.shp
  - Cell\_5km\_12.shp
  - Cell\_5km\_21.shp
  - Cell\_5km\_22.shp
  - Comunidades.shp
  - Fill\_hidrografia.shp
  - Hidrografia.shp
  - Hidrografia\_1000\_00\_ANA.shp
  - Sub\_Bacias.shp
- Nome: Fill\_comunidade
- Tipo: Shapefile (\*.shp \*.SHP)

# COMUNIDADES (PONTO)

Comunidades

		FID	Id	Populacao
1		0	0	50
2		1	0	156

Vector To Vector

**Spatial operations between two layers**

Input

From Layer: Comunidades

To Layer: Cell\_5km\_11

Select attributes...

Spatial Relation

Inside  Inside Or Covered By  Intercepts  Crosses

Output

Repository: iruaUna/Fill\_comunidade.shp

Layer Name: Fill\_comunidade.shp

Operation

Select all:

Reject all:

- FID Sum of values
- FID Total number of values
- FID Total not null values
- FID Standard deviation
- FID Variance
- FID Skewness
- FID Kurtosis
- FID Amplitude
- FID Median
- FID Coefficient variation
- FID Mode
- FID Class with highest occurrence
- FID Minimum Distance
- FID Minimum Distance From Centroid
- FID Presence

Id : Value  
Id : Minimum value  
Id : Maximum value  
Id : Mean

Help Ok Cancel

Vector To Vector

**Spatial operations between two layers**

Input

From Layer: Comunidades

To Layer: Cell\_5km\_11

Select attributes...

Spatial Relation

Inside  Inside Or Covered By  Intercepts  Crosses

Output

Repository: iruaUna/Fill\_comunidade.shp

Layer Name: Fill\_comunidade.shp

Operation

Select all:

Reject all:

- Populacao Value
- Populacao Minimum value
- Populacao Maximum value
- Populacao Mean
- Populacao Sum of values
- Populacao Total number of values
- Populacao Total not null values
- Populacao Standard deviation
- Populacao Variance
- Populacao Skewness
- Populacao Kurtosis
- Populacao Amplitude
- Populacao Median
- Populacao Coefficient variation
- Populacao Mode
- Populacao Class with highest occurrence
- Populacao Minimum Distance
- Populacao Minimum Distance From Centroid
- Populacao Presence

Help Ok Cancel

# COMUNIDADES (PONTO)

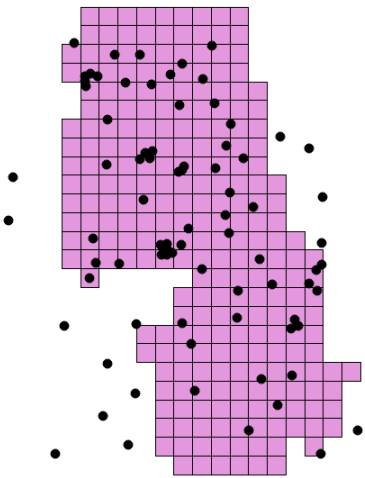
TerraView-5.2.1 - Curua \*

Arquivo Exibir Projeto Camada Mapa Ferramentas Plugins Processing Ajuda

Explorador de Camada

Camadas

- Comunidades
  - Estilo
- Hidrografia\_100000\_ANA
  - Estilo
- Sub\_Bacias
  - Estilo
- SRTM\_30m.tif
- Cell\_5km\_11
- Cell\_5km\_12
- Cell\_5km\_21
- Cell\_5km\_22
- Fill\_hidrografia
- Fill\_comunidade



Fill\_comunidade

FID	id	col	row	fid_total_	fid_presen	populacao_	populaca_1	populaca_2	populaca_3
0	C06L00	6	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
1	C07L00	7	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
2	C08L00	8	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
3	C09L00	9	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
4	C10L00	10	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
5	C11L00	11	0	0.000000	0	0.000000	0.000000	0.000000	0.000000
6	C05L01	5	1	0.000000	0	0.000000	0.000000	0.000000	0.000000

Linhas selecionadas: 3 EPSG:32721 (736949.86718, 9515884.52389) 683271

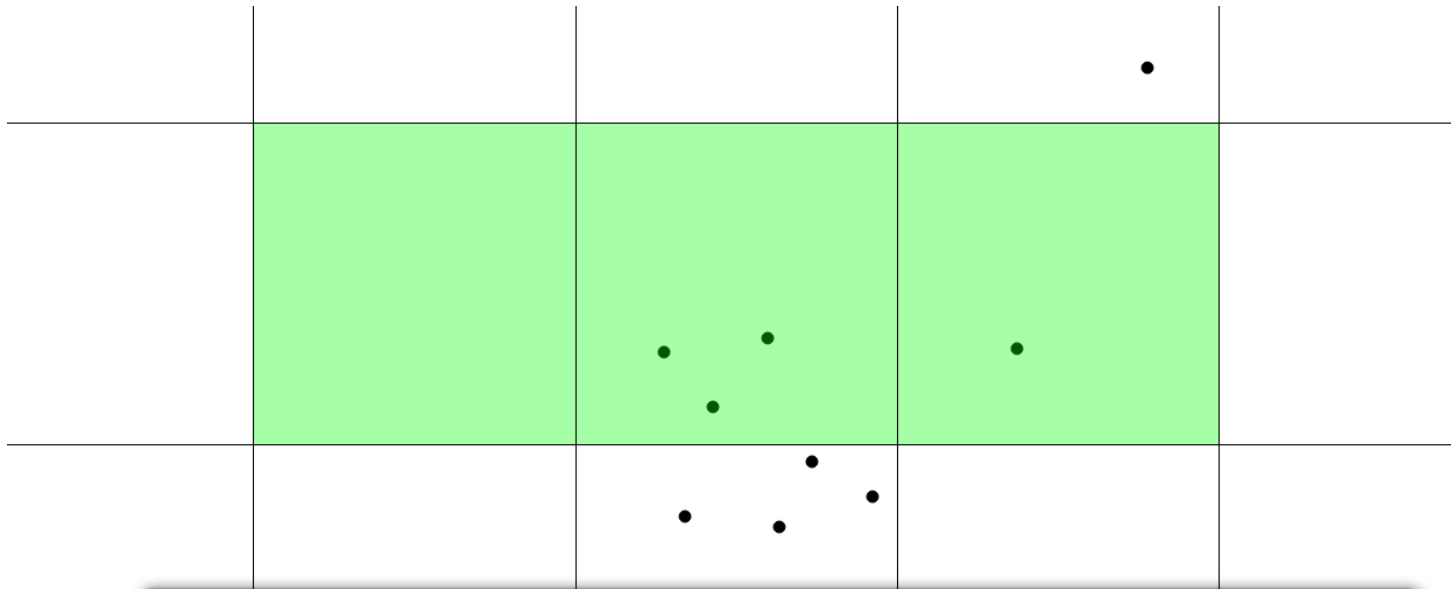
# COMUNIDADES (PONTO)

The image shows two screenshots of the 'Spatial operations between two layers' dialog box in QGIS. The left screenshot shows the 'Operation' list with 'FID Presence' selected. The right screenshot shows the 'Output' section with 'Populacao' selected for each operation. Below the screenshots is a table with columns: FID, id, col, row, fid\_total\_, fid\_presen, populacao\_, populaca\_1, populaca\_2, populaca\_3.

FID	id	col	row	fid_total_	fid_presen	populacao_	populaca_1	populaca_2	populaca_3
169	C06L16	6	16	3.000000	1	15.000000	69.000000	45.333333	136.000000
170	C07L16	7	16	0.000000	0	0.000000	0.000000	0.000000	0.000000
171	C08L16	8	16	1.000000	1	140.000000	140.000000	140.000000	140.000000
172	C09L16	9	16	1.000000	1	42.000000	42.000000	42.000000	42.000000

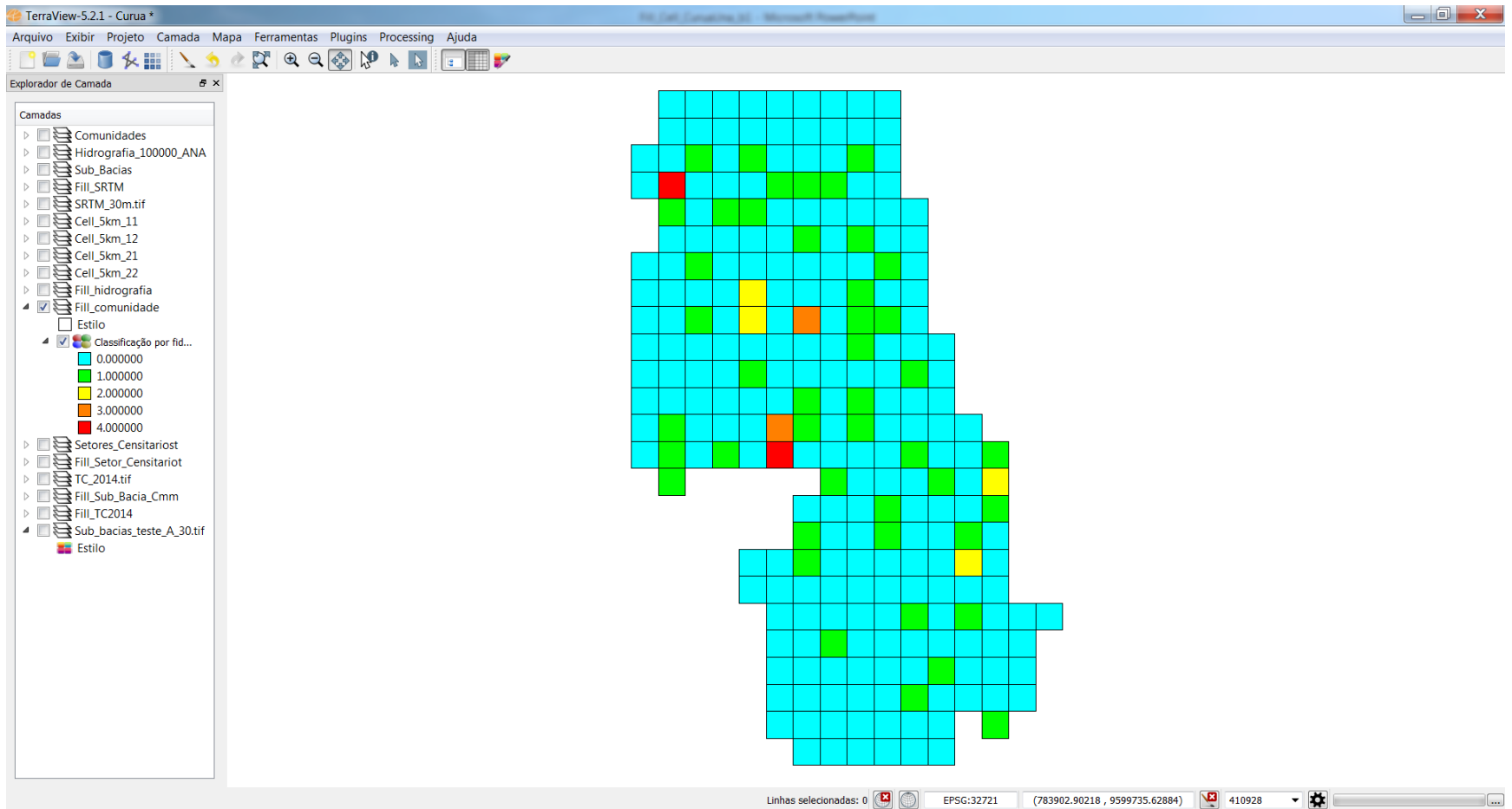


# COMUNIDADES (PONTO)



	FID	id	col	row	fid_total_	fid_presen	populacao_	populaca_1	populaca_2	populaca_3
117	116	C03L12	3	12	0.000000	0	0.000000	0.000000	0.000000	0.000000
118	117	C04L12	4	12	0.000000	0	0.000000	0.000000	0.000000	0.000000
119	118	C05L12	5	12	3.000000	1	19.000000	73.000000	47.000000	141.000000
120	119	C06L12	6	12	1.000000	1	22.000000	22.000000	22.000000	22.000000
121	120	C07L12	7	12	0.000000	0	0.000000	0.000000	0.000000	0.000000
122	121	C08L12	8	12	1.000000	1	23.000000	23.000000	23.000000	23.000000
123	122	C09L12	9	12	0.000000	0	0.000000	0.000000	0.000000	0.000000

# COMUNIDADES (PONTO)



Densidade (número de comunidades por célula)

# SETOR CENSITÁRIO (POLÍGONO)

- População por célula (soma dos valores);
- Soma ponderada por área;
- Média ponderada por área;
- Desvio padrão.

# SETOR CENSITÁRIO (POLÍGONO)

The screenshot displays the TerraView 5.2.1 interface. The main map area shows a purple-shaded polygon representing a census sector. The left sidebar, titled 'Explorador de Camada', lists various layers, with 'setor\_censitario' selected and its style set to purple. Below the map, a table titled 'setor\_censitario' provides the following data:

FID	ID	CD_GEOCODI	TIPO	CD_GEOCODB	NM_BAIRRO	CD_GEOCODS	NM_SUBDIST	CD_GEOCODD	NM_DISTRIT	CD_GEOCODM	NM_MUNICIP	NM_MICRO	NM_MESO	POPULACAO
1	0	8477.000000	1500602050...	RURAL		15006020500		150060205	ALTAMIRA	1500602	ALTAMIRA	ALTAMIRA	SUDOESTE ...	200
2	1	14517.000000	1505650050...	URBANO		15056500500		150565005	PLACAS	1505650	PLACAS	SANTAR	BAIXO AMA...	25
3	2	14518.000000	1505650050...	URBANO		15056500500		150565005	PLACAS	1505650	PLACAS	SANTAR	BAIXO AMA...	15
4	3	14519.000000	1505650050...	URBANO		15056500500		150565005	PLACAS	1505650	PLACAS	SANTAR	BAIXO AMA...	33
5	4	14520.000000	1505650050...	RURAL		15056500500		150565005	PLACAS	1505650	PLACAS	SANTAR	BAIXO AMA...	76

At the bottom of the interface, the status bar shows 'Linhas selecionadas: 0', the coordinate system 'EPSG:32721', and the coordinates '(815019.37094, 9467036.80381)'.

# SETOR CENSITÁRIO (POLÍGONO)

The screenshot displays the TerraView 5.2.1 interface. On the left, the 'Explorador de Camada' (Layer Explorer) shows a list of layers including 'Comunidades', 'Hidrografia\_100000\_ANA', 'Sub\_Bacias', 'Fill\_SRTM', 'SRTM\_30m.tif', 'Cell\_5km\_11', 'Cell\_5km\_12', 'Cell\_5km\_21', 'Cell\_5km\_22', 'Fill\_hidrografia', 'Fill\_comunidade', 'Setores\_Censitariost', 'Fill\_Setor\_Censitariot', 'TC\_2014.tif', 'Fill\_Sub\_Bacia\_Cmm', 'Fill\_TC2014', 'Sub\_bacias\_teste\_A\_30.tif', 'fill\_censo\_rural', 'setor\_censitario', 'Fill\_SetorCensitario', and 'Fill\_SetorCensitario\_desv...'. The main window shows the 'Vector To Vector' dialog box with the following settings:

- Spatial operations between two layers**
- Input:** From Layer: setor\_censitario; To Layer: Cell\_5km\_11; Select attributes... button.
- Spatial Relation:**  Intercepts;  Inside;  Inside Or Covered By;  Crosses.
- Operation:** Select all: (empty); Reject all: (empty).
- Output:** Repository: (empty); Layer Name: (empty).
- Operation List:** POPULACAO : Mean; POPULACAO : Sum of values; POPULACAO : Total number of values; POPULACAO : Total not null values; POPULACAO : Standard deviation; POPULACAO : Variance; POPULACAO : Skewness; POPULACAO : Kurtosis; POPULACAO : Amplitude; POPULACAO : Median; POPULACAO : Coefficient variation; POPULACAO : Mode; POPULACAO : Class with highest occurrence; POPULACAO : Class with highest intersect; POPULACAO : Percentage of each Class by; POPULACAO : Percentage per Class; POPULACAO : Minimum Distance; POPULACAO : Minimum Distance From Cer; POPULACAO : Presence; POPULACAO : Weighted by Area; POPULACAO : Weighted Sum by Area; POPULACAO : Percentage of Total Area.

Buttons: Help, Ok, Cancel.

Bottom status bar: Linhas selecionadas: 0; EPSG:32721; (683962.27522, 9580326.86940); 410928.

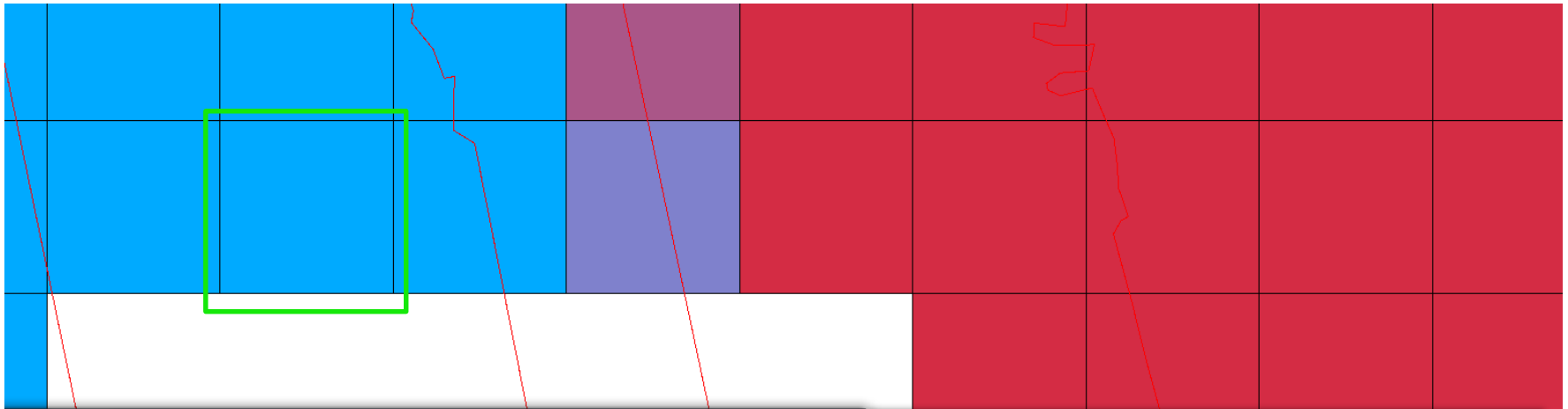
# SETOR CENSITÁRIO (POLÍGONO)

The screenshot displays the TerraView 5.2.1 interface. The main map area shows a grid of census sectors colored in blue, purple, and red. A red line indicates a boundary or path across the grid. The 'Explorador de Camada' (Layer Explorer) on the left lists various data layers, with 'setor\_censitario' and 'Fill\_SetorCensitario' selected. Below the map, two data tables are open:

Fill_SetorCensitario									
	FID	id	col	row	populacao_0	populaca_1	populaca_2	populaca_3	
100	99	C00L11	0	11	55.000000	5.131601	19.863945	4.057322	
101	100	C01L11	1	11	53.000000	13.435029	18.423483	2.240319	
102	101	C02L11	2	11	53.000000	13.435029	35.955567	3.378238	
103	102	C03L11	3	11	36.000000	0.000000	36.000000	3.381121	
104	103	C04L11	4	11	62.000000	7.071068	31.331052	4.135788	
105	104	C05L11	5	11	157.000000	74.246212	70.552285	5.832584	
106	105	C06L11	6	11	131.000000	0.000000	131.000000	6.965648	
107	106	C07L11	7	11	131.000000	0.000000	131.000000	6.965648	
108	107	C08L11	8	11	271.000000	6.363961	138.284512	3.926808	

setor_censitario						
	FID	ID	CD_GEOCODI	POPULACAO	TIPO	CD_GEOCODB
6	5	14521.000000	1505650050...	56	RURAL	
7	6	14524.000000	1505650050...	42	RURAL	
8	7	14525.000000	1505650050...	36	RURAL	
9	8	14526.000000	1505650050...	131	RURAL	
10	9	14527.000000	1505650050...	140	RURAL	
11	10	14528.000000	1505650050...	20	RURAL	
12	11	14529.000000	1505650050...	15	RURAL	
13	12	14531.000000	1505650050...	12	URBANO	
14	13	14532.000000	1505650050...	11	URBANO	

# SETOR CENSITÁRIO (POLÍGONO)



FID	id	col	row	populacao_0	populaca_1	populaca_2	populaca_3
99	C00L11	0	11	55.000000	5.131601	19.863945	4.057322
100	C01L11	1	11	53.000000	13.435029	18.423483	2.240319
101	C02L11	2	11	53.000000	13.435029	35.955567	3.378238
102	C03L11	3	11	36.000000	0.000000	36.000000	3.381121
103	C04L11	4	11	62.000000	7.071068	31.331052	4.135788
104	C05L11	5	11	157.000000	74.246212	70.552285	5.832584
105	C06L11	6	11	131.000000	0.000000	131.000000	6.965648
106	C07L11	7	11	131.000000	0.000000	131.000000	6.965648
107	C08L11	8	11	131.000000	6.263061	138.284513	2.026808

FID	ID	CD_GEOCODI	POPULACAO	TIPO	CD_GEOCODB
5	14521.000000	1505650050...	56	RURAL	
6	14524.000000	1505650050...	42	RURAL	
7	14525.000000	1505650050...	36	RURAL	
8	14526.000000	1505650050...	131	RURAL	
9	14527.000000	1505650050...	140	RURAL	
10	14528.000000	1505650050...	20	RURAL	
11	14529.000000	1505650050...	15	RURAL	
12	14531.000000	1505650050...	12	URBANO	
13	14532.000000	1505650050...	11	URBANO	

# SRTM (RASTER)

- Desvio padrão (Standard deviation);
- Valor máximo de altitude (Maximum value);
- Valor mínimo de altitude (Minimum value);
- Valor médio de altitude (Mean).



# SRTM (RASTER)

The image shows a screenshot of the TerraView 5.2.1 software interface. The main window displays a map with a color-coded SRTM (Shuttle Radar Topography Mission) raster. Overlaid on the map are two dialog boxes:

- Raster to Vector Dialog:** This dialog is titled "Applying statistics into a vector". It has the following fields and options:
  - Input:** Raster: SRTM\_30m.tif, Vector: Cell\_5km\_11.
  - Bands:** A list with "0" selected.
  - Statistics:** A list of statistical options including Minimum value, Maximum value, Mean, Sum of values, Total number of values, Total not null values, Standard deviation, Variance, Skewness, and Kurtosis.
  - Output:** A red box highlights the "Repository:" and "Layer Name:" fields.
- Save as... Dialog:** This dialog is open to the "Preenchimento\_Celula" folder. It shows several shapefile files (e.g., 155EE250GC\_SIR.shp, Cell\_5km\_11.shp, Cell\_5km\_12.shp, Cell\_5km\_21.shp, Cell\_5km\_22.shp, Comunidades.shp). The "Nome:" field is set to "Fill\_SRTM" and the "Tipo:" is "Shapefile (\*.shp \*.SHP)".

The status bar at the bottom of the TerraView window shows "Linhas selecionadas: 3", "EPSG:32721", and coordinates "(682334.79222, 9647836.39375)".

# SRTM (RASTER)

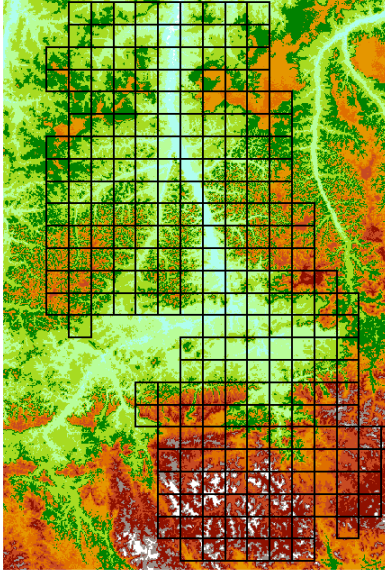
TerraView-5.2.1 - Curua \*

Arquivo Exibir Projeto Camada Mapa Ferramentas Plugins Processing Ajuda

Explorador de Camada

Camadas

- Comunidades
  - Estilo
- Hidrografia\_100000\_ANA
  - Estilo
- Sub\_Bacias
  - Estilo
- Fill\_SRTM
  - Estilo
  - SRTM\_30m.tif
  - Cell\_5km\_11
  - Cell\_5km\_12
  - Cell\_5km\_21
  - Cell\_5km\_22
  - Fill\_hidrografia
  - Fill\_comunidade
  - Setores\_Censitariost
  - Fill\_Setor\_Censitariot



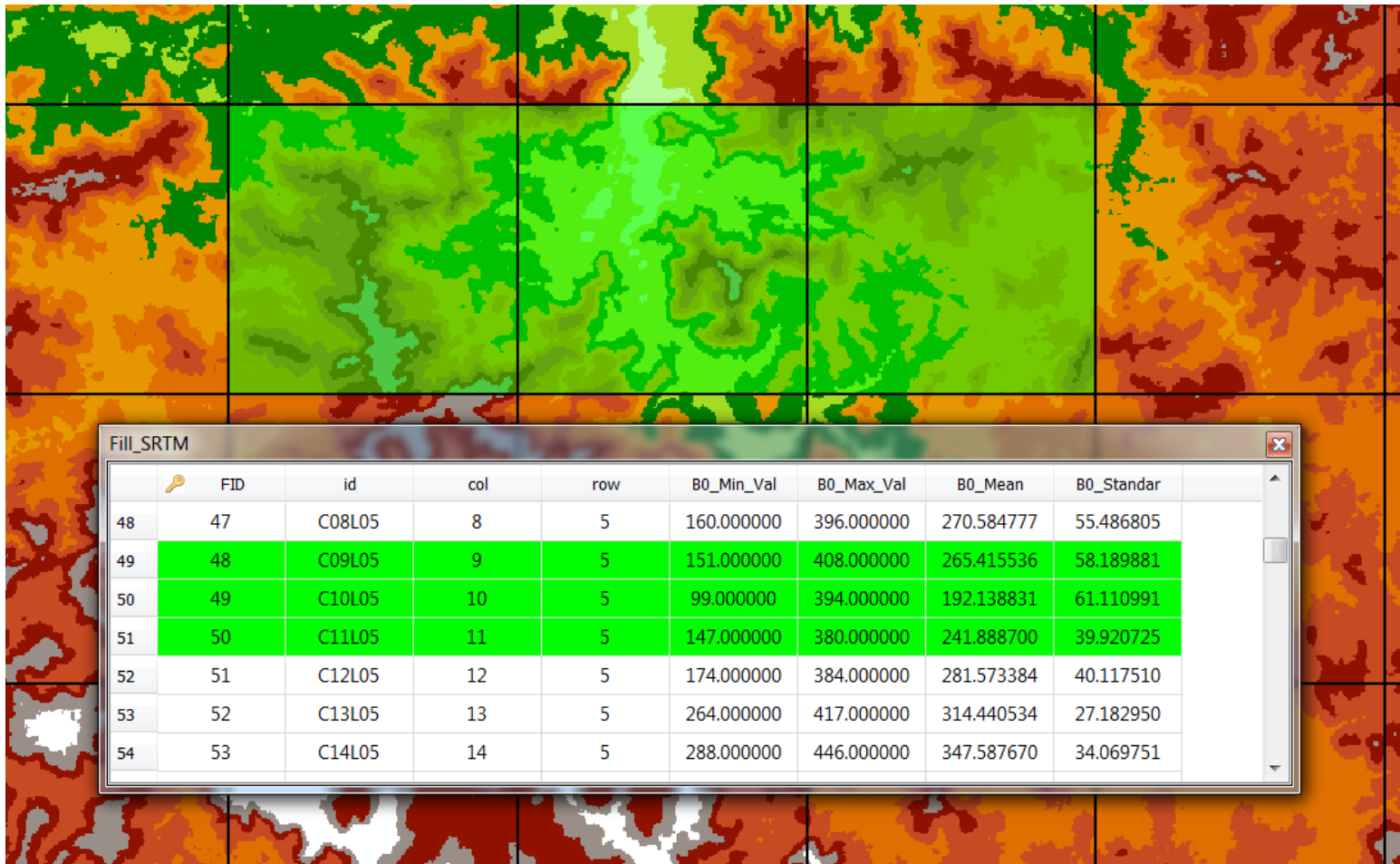
Fill\_SRTM

FID	id	col	row	B0_Min_Val	B0_Max_Val	B0_Mean	B0_Standar
0	C06L00	6	0	214.000000	448.000000	311.840002	49.351877
1	C07L00	7	0	277.000000	461.000000	371.814815	29.800517
2	C08L00	8	0	218.000000	453.000000	326.502492	51.443696
3	C09L00	9	0	230.000000	452.000000	362.128525	30.995667
4	C10L00	10	0	257.000000	455.000000	366.383135	23.652146
5	C11L00	11	0	231.000000	466.000000	357.378000	41.275196
6	C05L01	5	1	262.000000	443.000000	353.093091	26.209220

Linhas selecionadas: 0

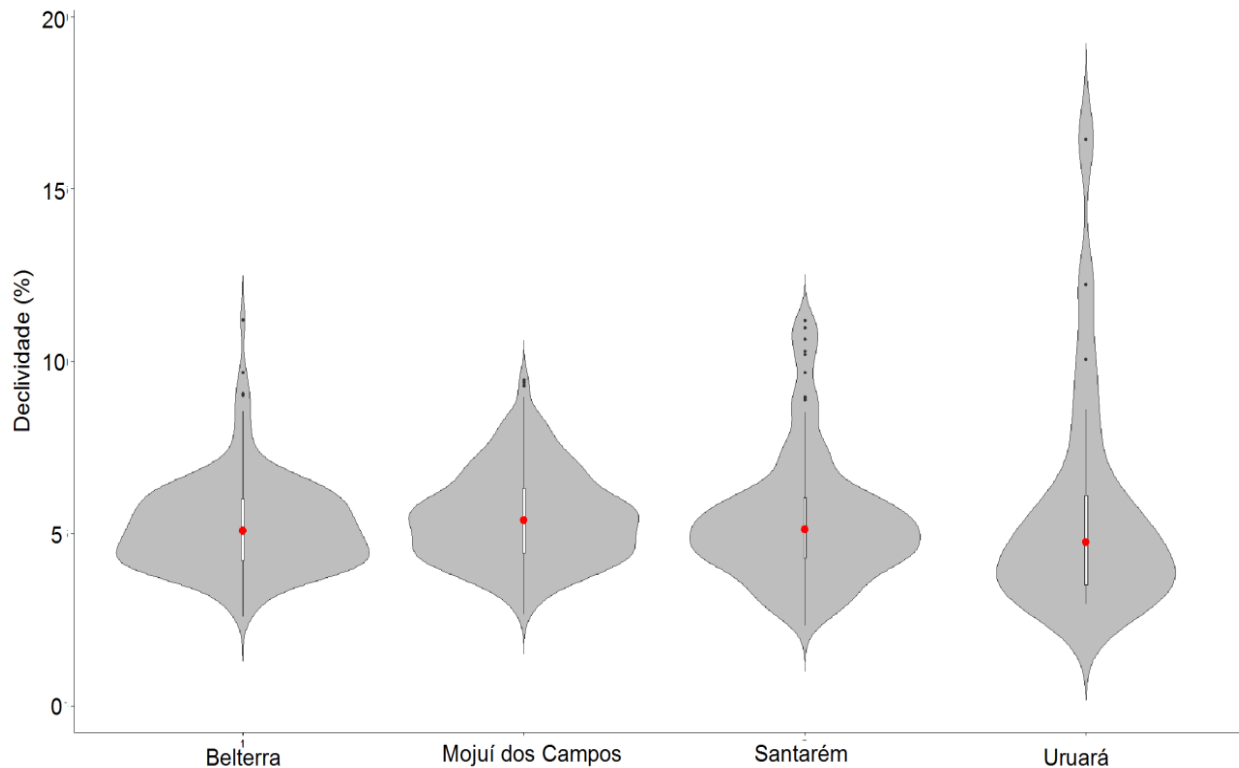
EPSG:32721 (736502.14822, 9532906.22215) 572125

# SRTM (RASTER)



# EXEMPLO PRÁTICO - SRTM

Distribuição da declividade por município nas células com área de Agricultura Anual.



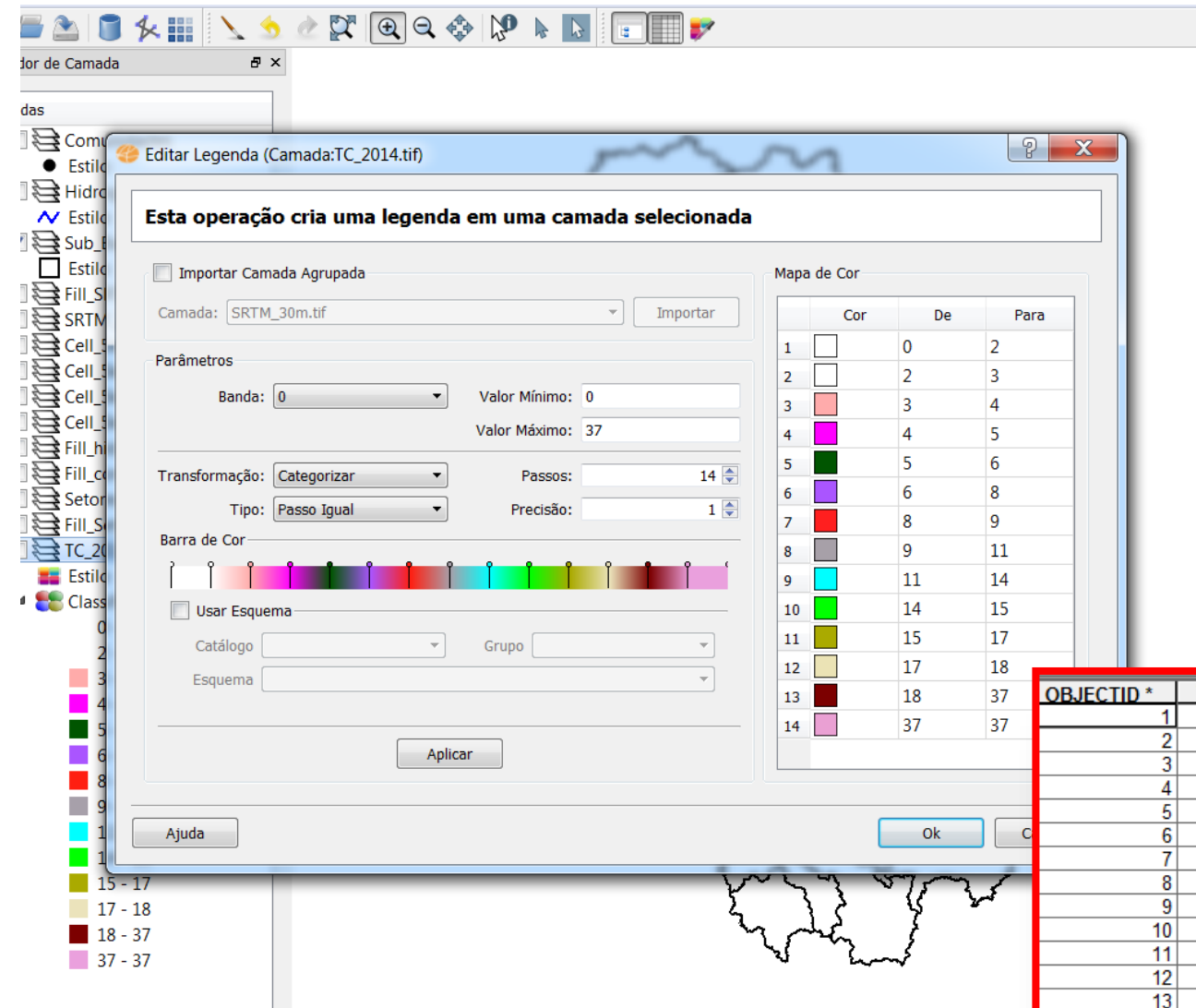
Média da declividade por célula e posterior plote da distribuição média da declividade e mediana por município.

(gráfico produzido no R)

# TERRACCLASS 2014 (RASTER)

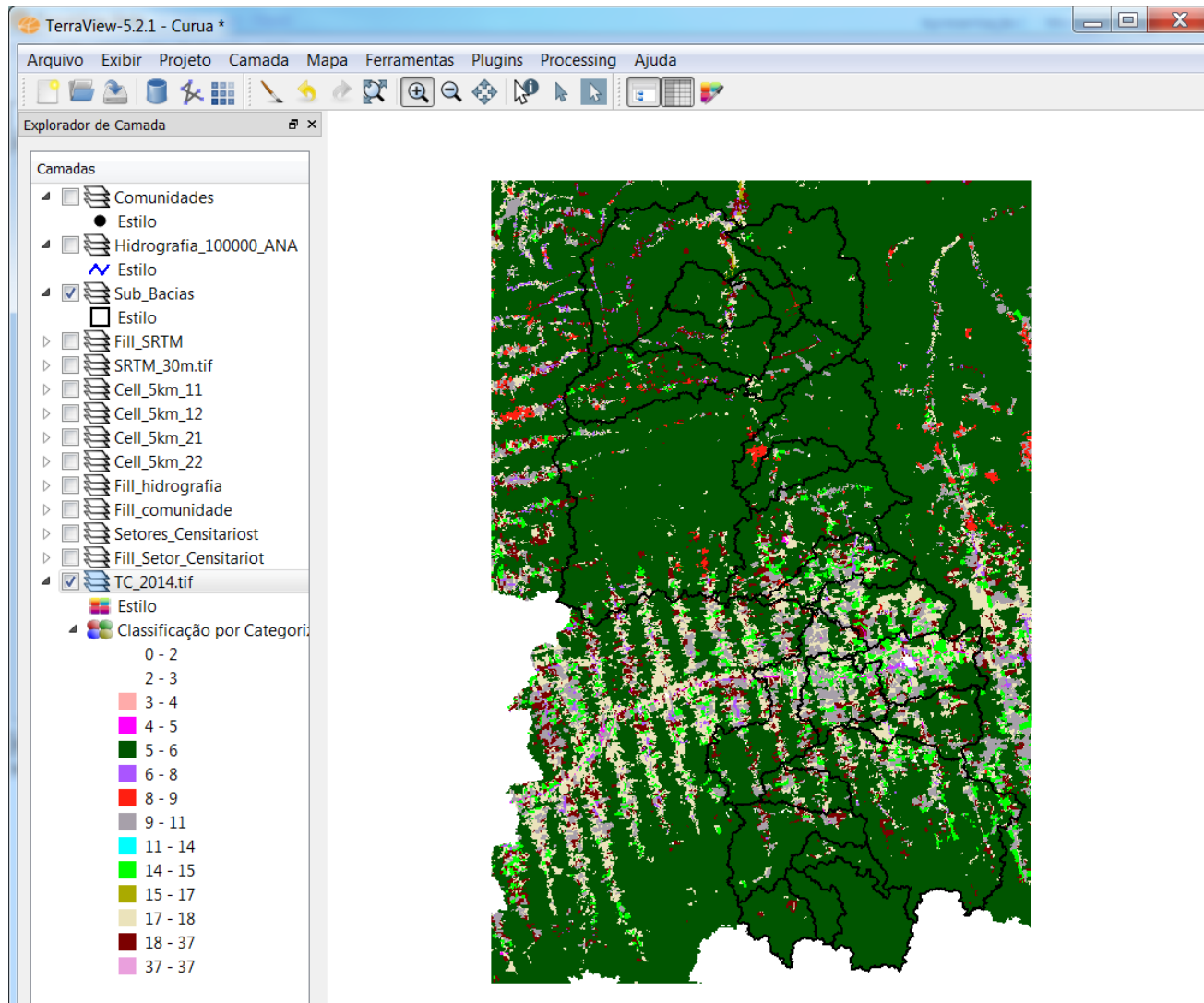
- Classe majoritária (mode);
- Percentual de classe por célula.

# TERRACLASS 2014 (RASTER)



OBJECTID *	Value	Count	Classe
1	0	789608	DV
2	2	5600	AREA URBANA
3	3	159	NAO FLORESTA
4	4	12532	OUTROS
5	5	8706076	FLORESTA
6	6	83228	MOSAICO DE OCUPACOES
7	8	79428	AREA NAO OBSERVADA
8	9	683374	PASTO LIMPO
9	11	10	PASTO COM SOLO EXPOSTO
10	14	314244	PASTO SUJO
11	15	7340	HIDROGRAFIA
12	17	1018444	VEGETACAO SECUNDARIA
13	18	446432	REGENERACAO COM PASTO
14	37	20255	DESMATAMENTO 2014

# TERRACLASS 2014 (RASTER)



# TERRACLASS 2014 (RASTER)

The image shows a screenshot of the TerraView 5.2.1 software interface. The main window displays a map with various layers listed in the 'Explorador de Camada' (Layer Explorer) on the left. The 'Raster to Vector' dialog box is open, showing the process of applying statistics to a vector. The 'Input' section shows the raster 'TC\_2014.tif' being converted to the vector 'Cell\_5km\_11'. The 'Bands' section shows the value '0'. The 'Statistics' section lists various statistical measures: Standard deviation, Variance, Skewness, Kurtosis, Amplitude, Median, Coefficient variation, Mode, and Percent of each class by area. The 'Output' section shows the repository and layer name fields. A 'Save as...' dialog box is also open, showing the file 'Fill\_TC2014' being saved as a Shapefile (\*.shp) in the 'Dados (D:)' folder. The status bar at the bottom shows 'Linhas selecionadas: 0', 'EPSG:32721', and coordinates '(681399.19527, 9652776.23983)'. The system tray shows the date '4/5/2014' and the time '10:00'.

TerraView-5.2.1 - Curua \*

Arquivo Exibir Projeto Camada Mapa Ferramentas Plugins Processing Ajuda

Explorador de Camada

Camadas

- Comunidades
- Hidrografia\_100000\_ANA
- Sub\_Bacias
- Fill\_SRTM
- SRTM\_30m.tif
- Cell\_5km\_11
- Cell\_5km\_12
- Cell\_5km\_21
- Cell\_5km\_22
- Fill\_hidrografia
- Fill\_comunidade
- Setores\_Censitariost
- Fill\_Setor\_Censitariot
- TC\_2014.tif
- Fill\_Sub\_Bacia\_Cmm
- Fill\_TC2014
- Sub\_bacias\_teste\_A\_30.tif

Raster to Vector

Applying statistics into a vector

Input

Raster: TC\_2014.tif  No Data Value:

Vector: Cell\_5km\_11

Only Selected

Bands

0

Statistics

- Standard deviation
- Variance
- Skewness
- Kurtosis
- Amplitude
- Median
- Coefficient variation
- Mode
- Percent of each class by area

Texture  Read All

Output

Repository:

Layer Name:

Help Ok Cancel

Save as...

Organizar Nova pasta

testes\_comunidade

Cell\_5000.shp

Cell\_5000\_linhas.shp

Nome: Fill\_TC2014

Tipo: Shapefile (\*.shp \*.SHP)

Salvar Cancelar

Linhas selecionadas: 0

EPSG:32721

(681399.19527, 9652776.23983)

4/5/2014 10:00



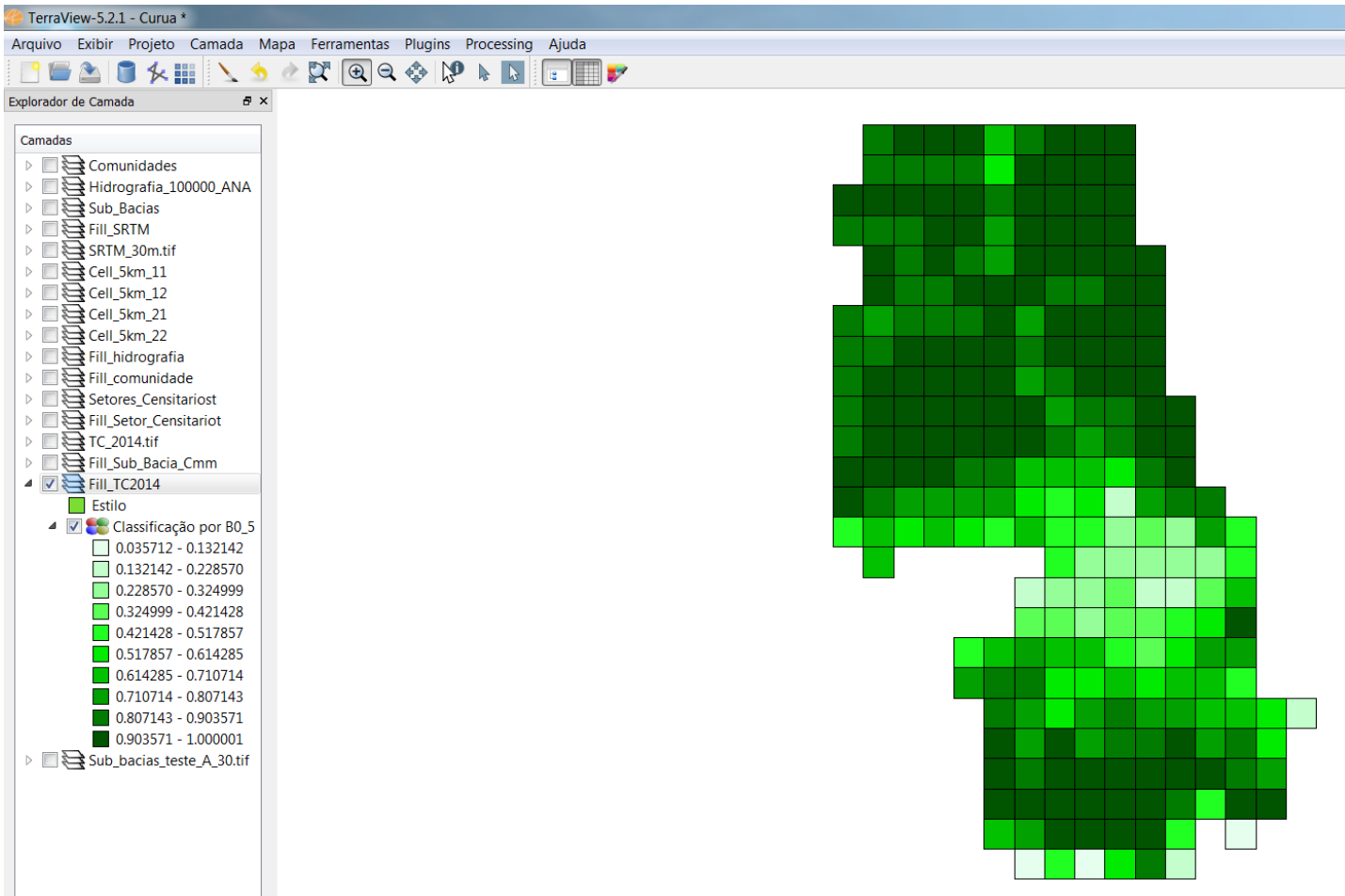
# TERRACLASS 2014 (RASTER)

The screenshot shows the TerraView 5.2.1 interface. The layer explorer on the left lists several layers, with 'Fill\_TC2014' selected. The main window displays a raster map of the TERRACLASS 2014, which is a grid of green cells. The data table at the bottom shows the following information:

FID	id	col	row	B0_Mode	B0_0	B0_2	B0_3	B0_4	B0_5	B0_6	B0_8	B0_9	B0_11	B0_14	B0_15	B0_17	B0_18	B0_37
1	0	C06L00	6	0	0.964287	0.000000	0.000000	0.000000	0.035713	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1	C07L00	7	0	0.566662	0.000000	0.000000	0.000000	0.433230	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000108	0.000000	0.000000
3	2	C08L00	8	0	0.936247	0.000000	0.000000	0.000000	0.063753	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4	3	C09L00	9	0	0.426476	0.000000	0.000000	0.000000	0.573524	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	4	C10L00	10	0	0.140682	0.000000	0.000000	0.000000	0.859318	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

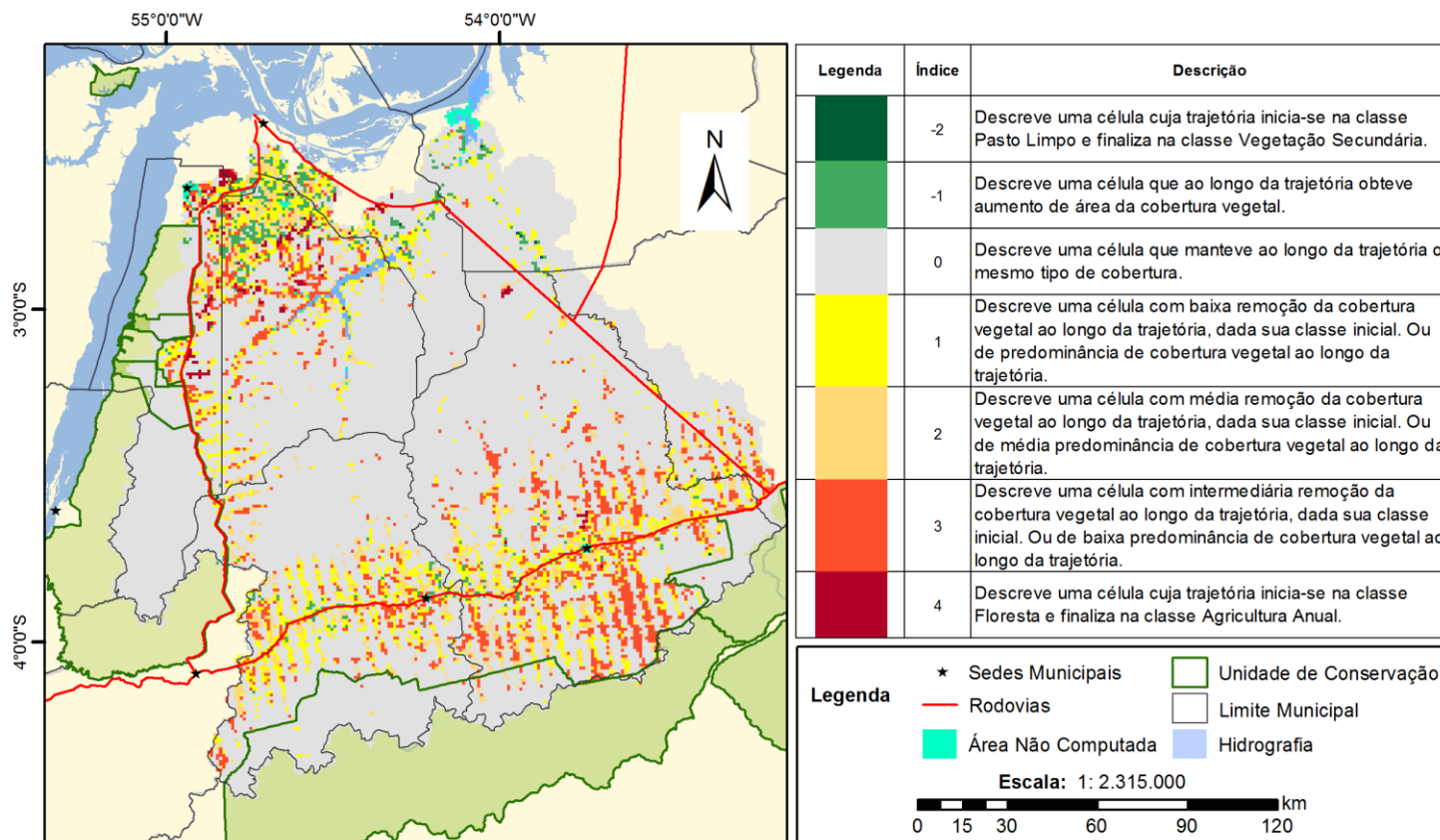
At the bottom of the interface, the status bar shows: Linhas selecionadas: 0, EPSG:32721, (687448.94501, 9570396.10004), 388004.

# TERRACCLASS 2014 (RASTER)



# EXEMPLO PRÁTICO

Mapa de Trajetória de Uso e Cobertura da Terra



Preenchimento de células com a classe majoritária do mapa temático de uso e cobertura da terra (raster) e posterior aplicação de operação aritmética para classificação quanto a trajetória de uso e cobertura da terra.

# PREENCHIMENTO PARA POLÍGONOS IRREGULARES

The screenshot displays the TerraView 5.2.1 interface. The main map area shows a set of irregular polygons with black dots scattered around and inside them. The 'Explorador de Camada' (Layer Explorer) on the left lists various layers, including 'Comunidades', 'Hidrografia\_100000\_ANA', 'Sub\_Bacias', and several 'Cell\_5km' layers. The 'Sub\_Bacias' layer is selected, and its data is shown in a table below the map.

	FID	OBJECTID	ID	GRIDCODE	Area
23	22	26	49	77	253.422057
24	23	27	50	50	78.566202
25	24	28	51	39	55.197211
26	25	29	52	44	186.072644
27	26	30	53	55	0.000949
28	27	31	54	55	0.000949

At the bottom of the interface, the status bar shows 'Linhas selecionadas: 1', the coordinate system 'EPSG:32721', and the coordinates '(712645.37780, 9523145.14410)'. The scale is set to 517467.

# PREENCHIMENTO PARA POLÍGONOS IRREGULARES

The screenshot displays the TerraView 5.2.1 interface. The 'Vector To Vector' dialog box is open, showing the 'Spatial operations between two layers' section. The 'From Layer' is set to 'Comunidades' and the 'To Layer' is 'Sub\_Bacias'. The 'Output' section is highlighted with a red box, showing the 'Repository' and 'Layer Name' fields. The 'Save as...' dialog box is also open, showing the file 'Fill\_Sub\_Bacia\_Cmm' being saved as a Shapefile (\*.shp). The 'Comunidades' table is visible at the bottom of the interface.

FID	Id	Populacao	
7	6	0	24
8	7	0	36
9	8	0	54
10	9	0	51
11	10	0	95

# PREENCHIMENTO PARA POLÍGONOS IRREGULARES

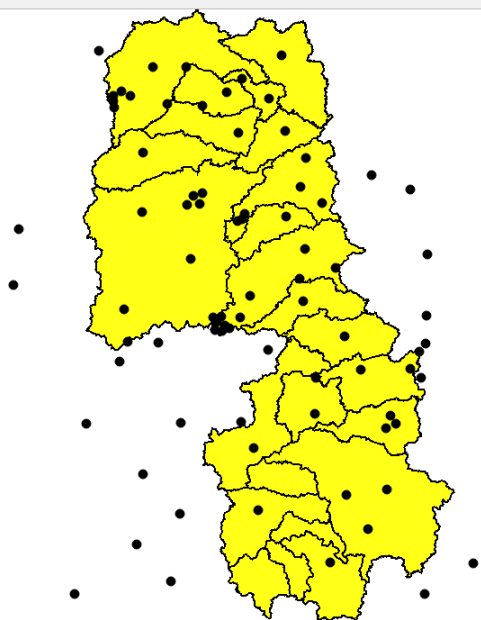
TerraView-5.2.1 - Curua\*

Arquivo Exibir Projeto Camada Mapa Ferramentas Plugins Processing Ajuda

Explorador de Camada

Camadas

- Comunidades
  - Estilo
- Hidrografia\_100000\_ANA
- Sub\_Bacias
  - Estilo
- Fill\_SRTM
- SRTM\_30m.tif
- Cell\_5km\_11
- Cell\_5km\_12
- Cell\_5km\_21
- Cell\_5km\_22
- Fill\_hidrografia
- Fill\_comunidade
- Setores\_Censitariost
- Fill\_Setor\_Censitariot
- TC\_2014.tif
- Fill\_Sub\_Bacia\_Cmm
  - Estilo



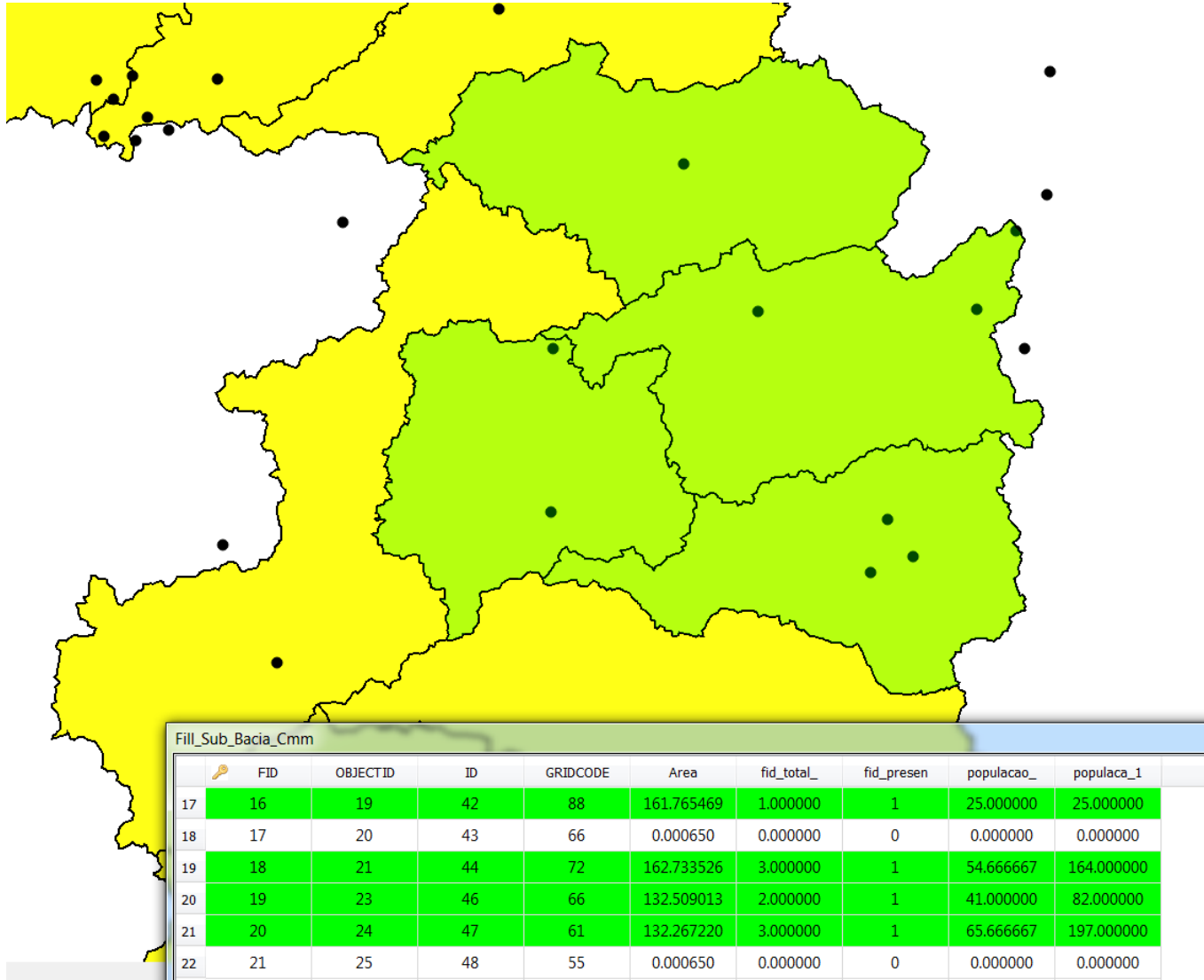
Fill\_Sub\_Bacia\_Cmm

FID	OBJECTID	ID	GRIDCODE	Area	fid_totall	fid_presen	populacao_	populaca_1
0	2	24	22	0.000650	0.000000	0	0.000000	0.000000
1	4	26	137	104.296459	1.000000	1	95.000000	95.000000
2	5	27	143	50.697966	2.000000	1	52.500000	105.000000
3	6	28	22	226.848244	1.000000	1	36.000000	36.000000
4	7	29	148	390.837159	6.000000	1	54.166667	325.000000

Sub\_Bacias Comunidades Fill\_Sub\_Bacia\_Cmm

Linhas selecionadas: 0 EPSG:32721 (689288.38229 , 9522962.75054) 517467

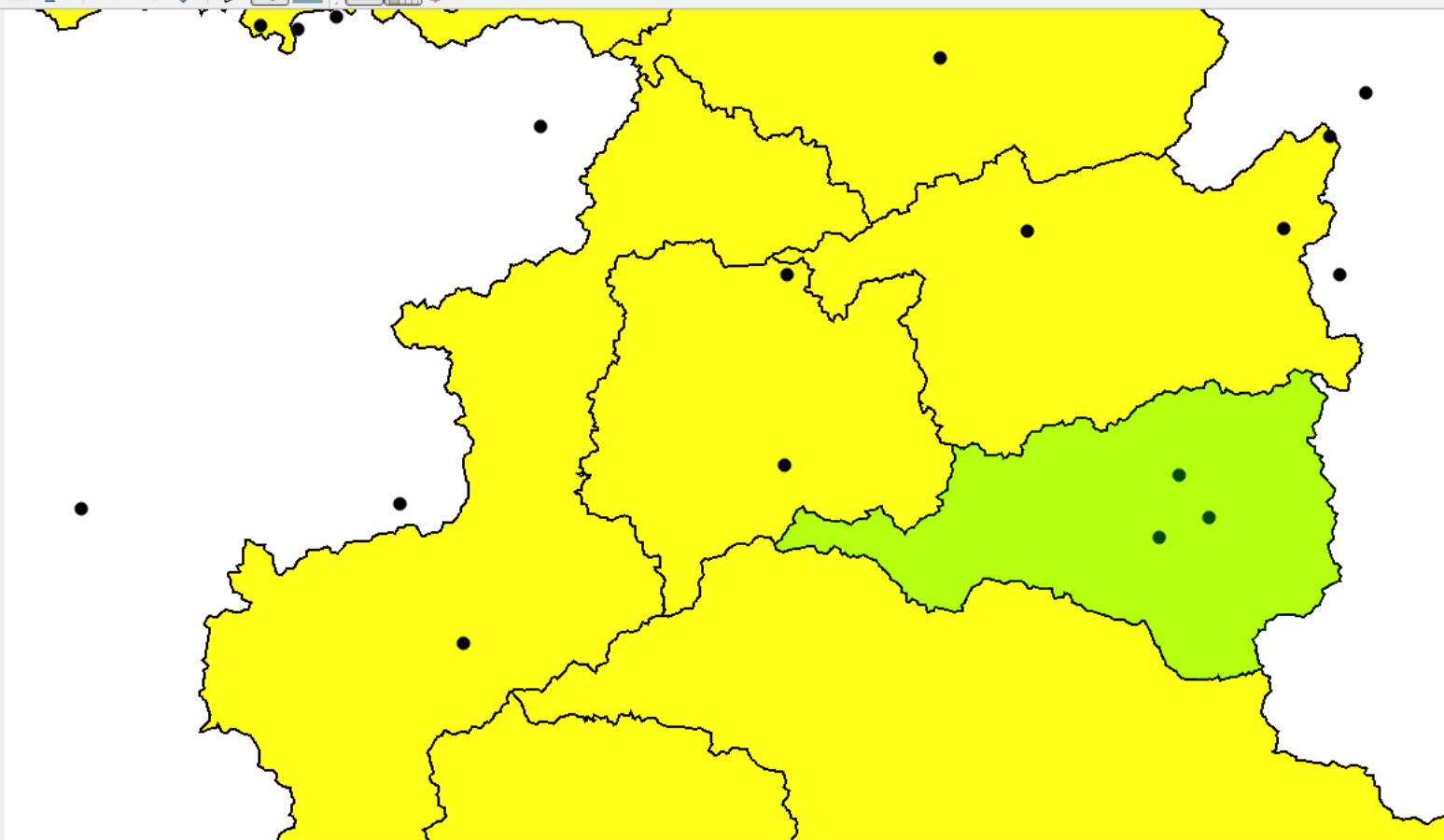
# PREENCHIMENTO PARA POLÍGONOS IRREGULARES





Explorador de Camada

- Camadas
- Comunidades
    - Estilo
  - Hidrografia\_100000\_ANA
  - Sub\_Bacias
    - Estilo
  - Fill\_SRTM
  - SRTM\_30m.tif
  - Cell\_5km\_11
  - Cell\_5km\_12
  - Cell\_5km\_21
  - Cell\_5km\_22
  - Fill\_hidrografia
  - Fill\_comunidade
  - Setores\_Censitariost
  - Fill\_Setor\_Censitariot
  - TC\_2014.tif
  - Fill\_Sub\_Bacia\_Cmm
    - Estilo



Fill\_Sub\_Bacia\_Cmm

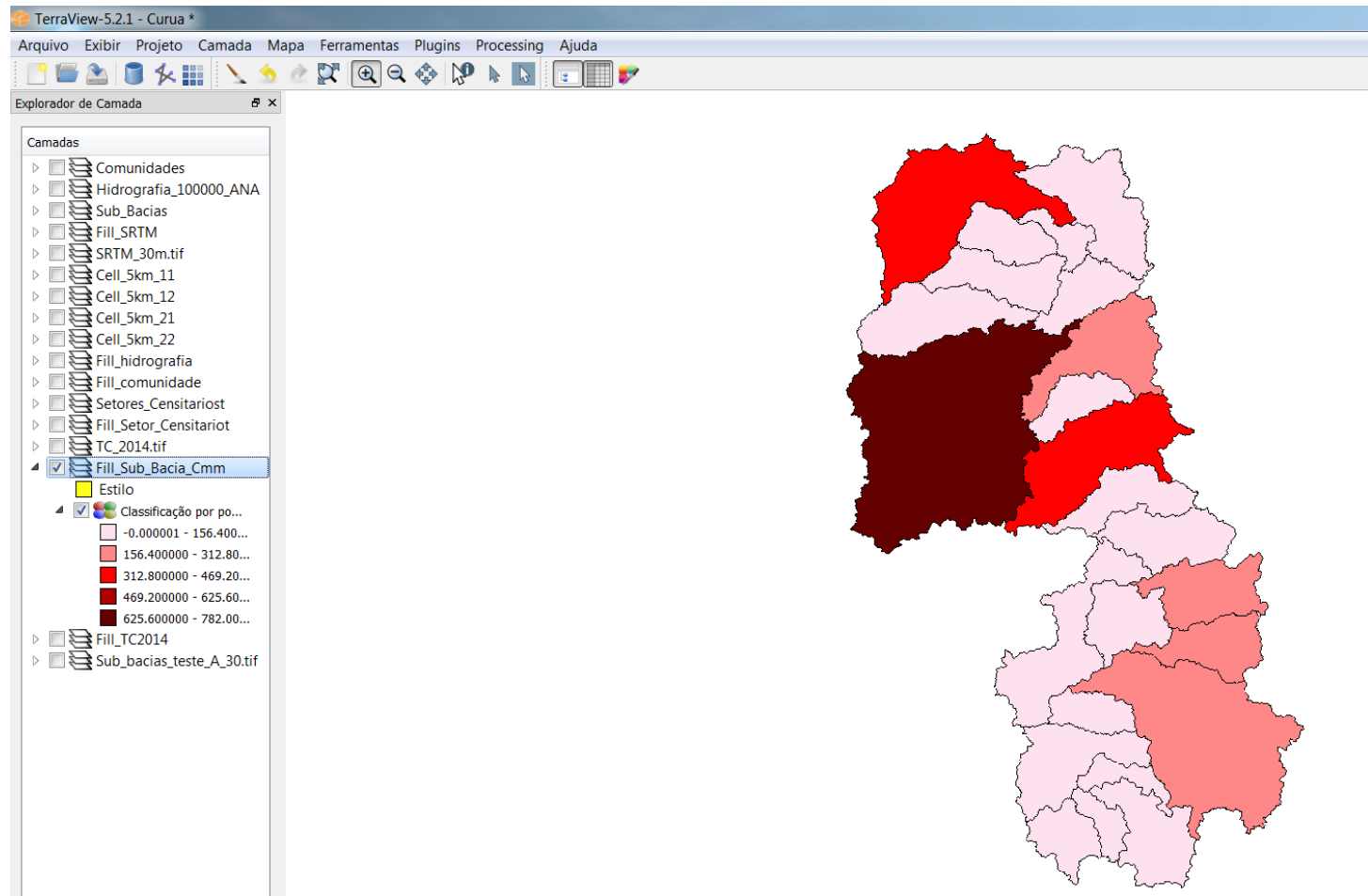
		FID	OBJECTID	ID	GRIDCODE	Area	fid_total_	fid_presen	populacao_	populaca_1
17		16	19	42	88	161.765469	1.000000	1	25.000000	25.000000
18		17	20	43	66	0.000650	0.000000	0	0.000000	0.000000
19		18	21	44	72	162.733526	3.000000	1	54.666667	164.000000
20		19	23	46	66	132.509013	2.000000	1	41.000000	82.000000
21		20	24	47	61	132.267220	3.000000	1	65.666667	197.000000
22		21	25	48	55	0.000650	0.000000	0	0.000000	0.000000

Comunidades

		FID	Id	Populacao
60		59	0	58
61		60	0	75
62		61	0	64
63		62	0	46
64		63	0	89
65		64	0	56



# PREENCHIMENTO PARA POLÍGONOS IRREGULARES



# ZONAL EM PYTHON

```
import geopandas as gpd
import pandas as pd
from rasterstats import zonal_stats

anomaly_raster = 'C:\\Lidiane\\2021\\Metodologia_GS\\AVSWI\\AVSWI_Nov18toFev19_SemMask.tif' # Isto é o caminho para o raster
categories = gpd.GeoDataFrame.from_file('C:\\Lidiane\\2021\\Metodologia_GS\\Regioes\\MG.shp') # caminho do shape
stats = zonal_stats(categories, anomaly_raster, stats=['mean', 'max']) # suas estatísticas em stats
stats = pd.DataFrame(stats)
#stats['A_0803'] = 100 * stats['count'] / (stats['count'] + stats['nodata']) # cria coluna nova com uma conta feita com outras colunas
stats['AVSWI19Med'] = stats['mean']
stats['AVSWI19Max'] = stats['max']
categories = categories.join(stats) #adiciona no shape original as colunas novas
nome_da_saida = 'C:\\Lidiane\\2021\\Metodologia_GS\\Regioes\\AVSWI_MG.shp'
categories.to_file(driver='ESRI Shapefile',filename=nome_da_saida)
```