



Universidade Federal do ABC
Bacharelado em Planejamento Territorial

Planejamento Sistemático de Conservação

Disciplina: Biodiversidade, Geodiversidade e Paisagem

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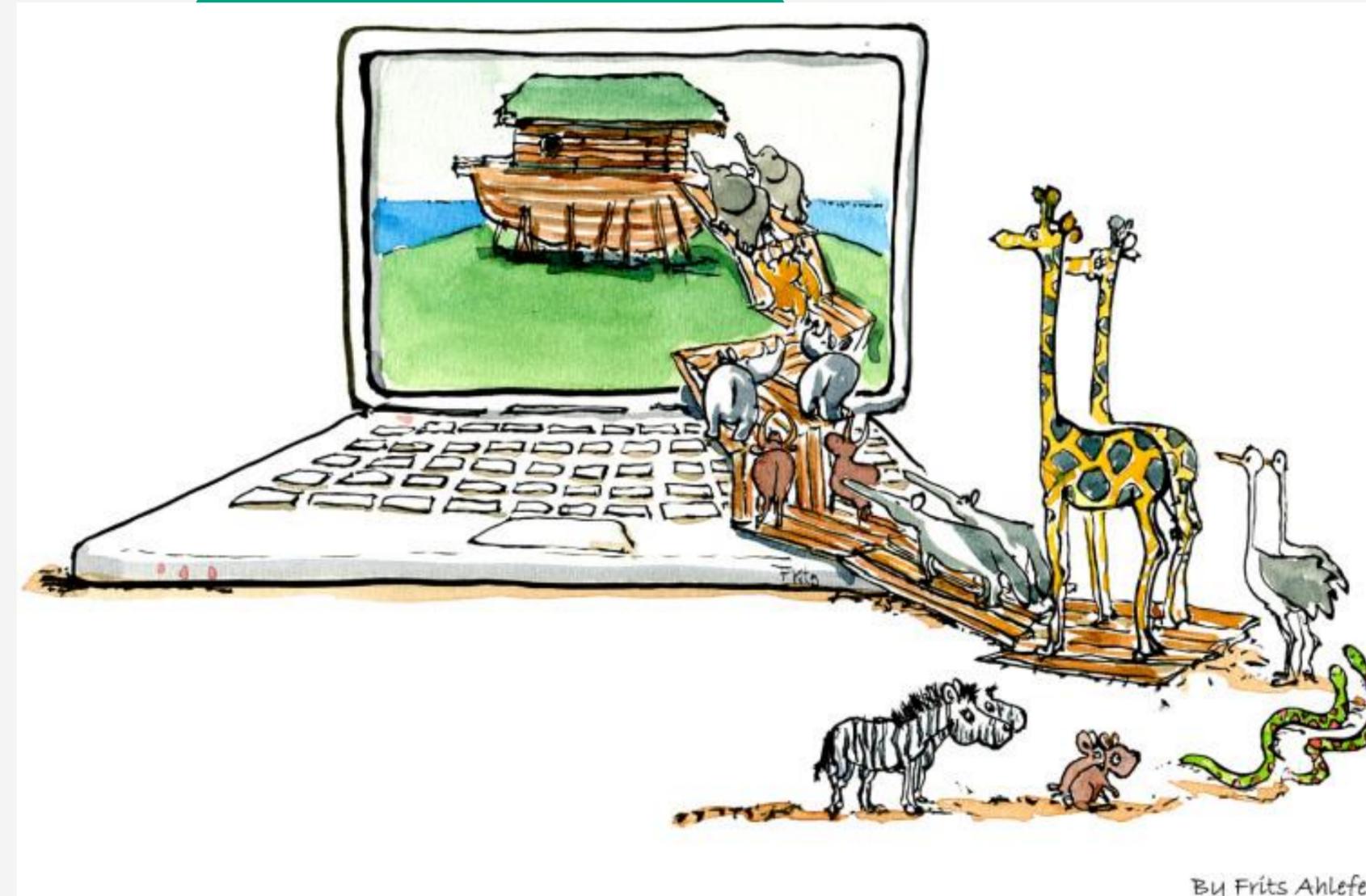
Vitor Vieira Vasconcelos

2026.1



Conteúdo

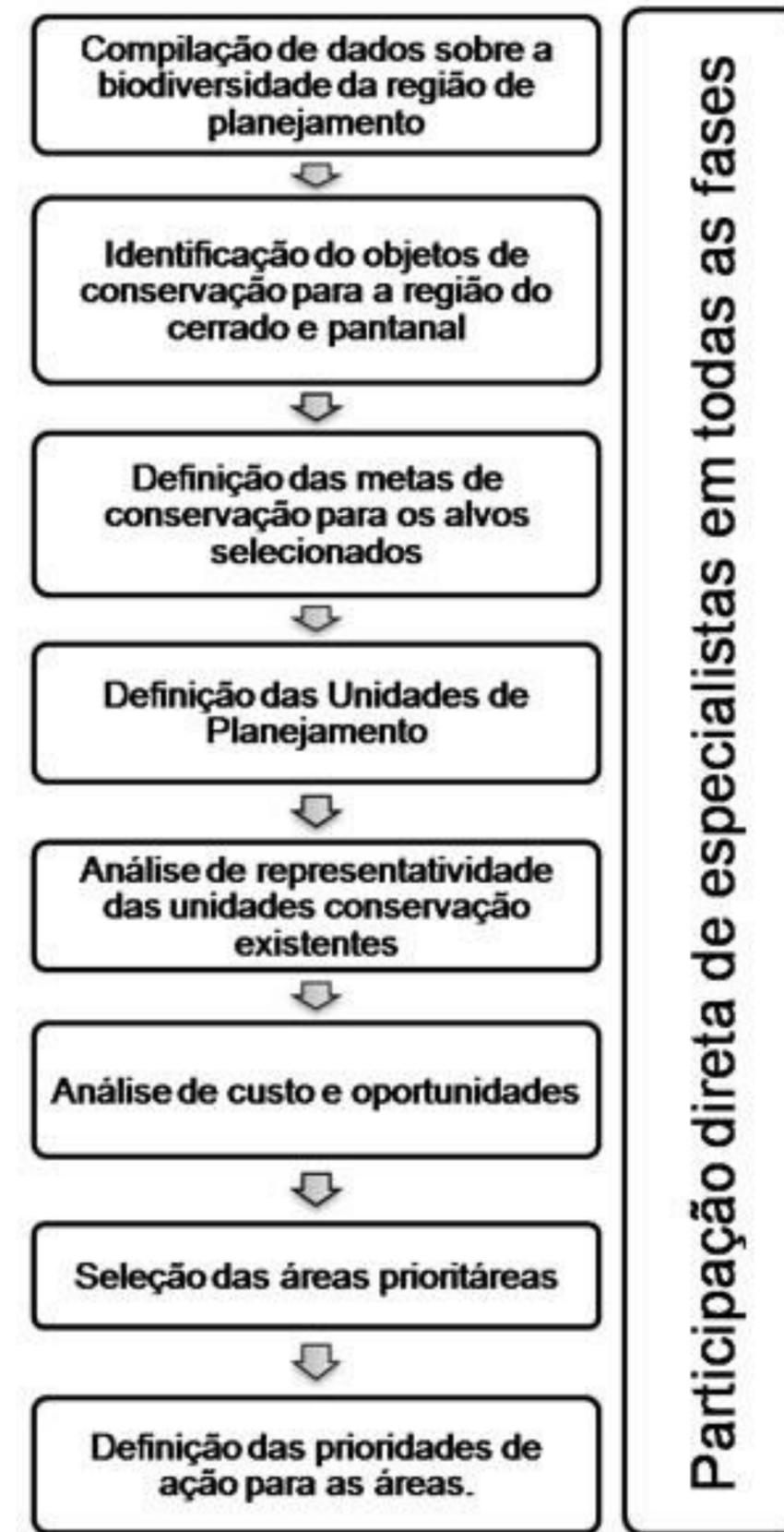
- Planejamento Sistemático de Conservação



By Frits Ahlefeldt

- Quais são as áreas mais adequadas para preservação ambiental?
- Uso de modelos espaciais + técnicas participativas
- Deliberação CONABIO no 39, de 14 de dezembro de 2005

Margules, C. R. and Pressey, R. L. Systematic conservation planning. Nature. 405, 243-253 (11 May 2000)

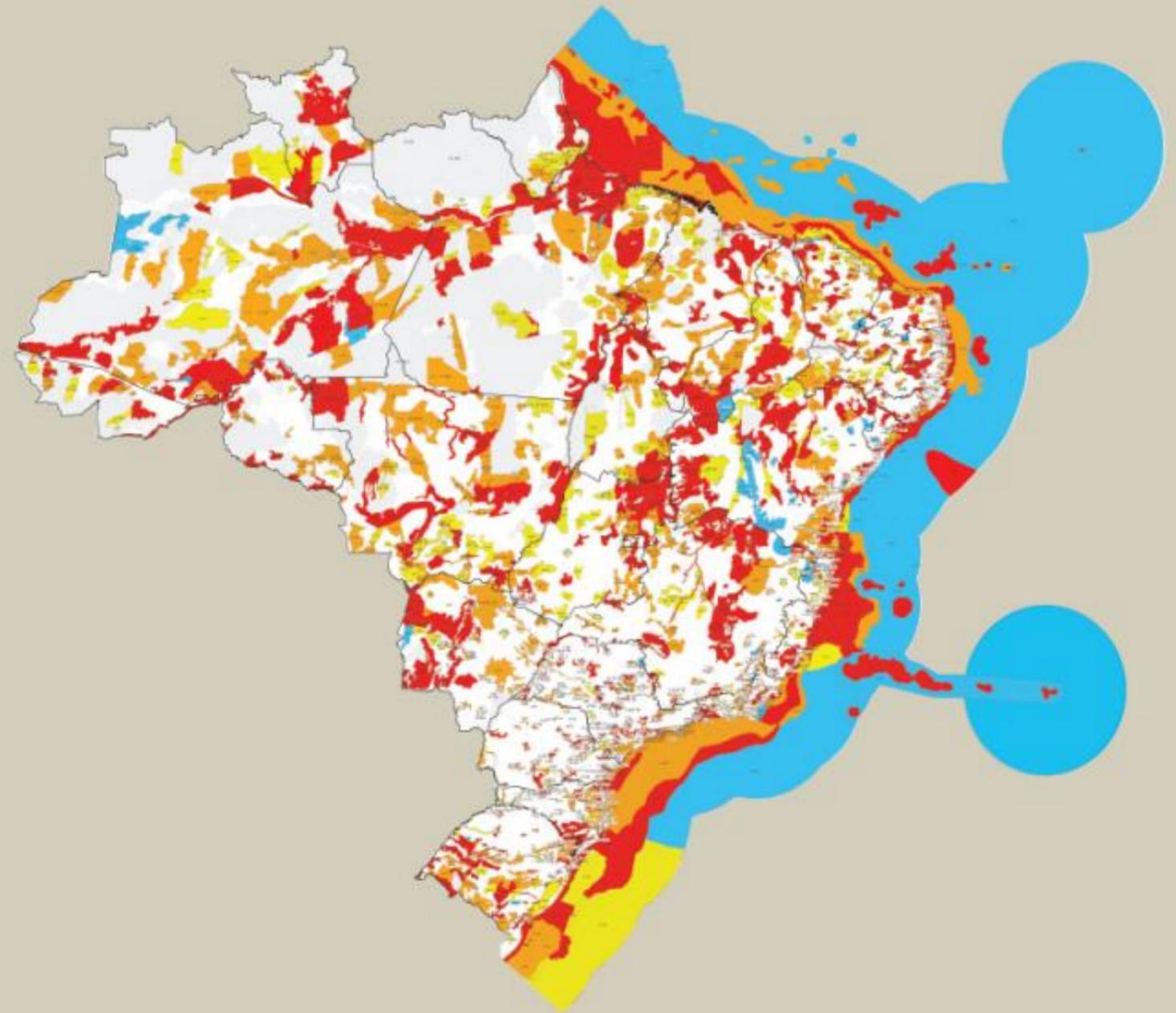


(WWF, 2018)

Princípios:

- Representatividade
- Vulnerabilidade
- Eficiência
- Complementaridade
- Flexibilidade
- Insubstituibilidade
- Compacidade

Áreas Prioritárias para a Conservação, Uso Sustentável e Repartição de Benefícios da Biodiversidade Brasileira:
Atualização - Portaria MMA Nº 09, de 23 de janeiro de 2007

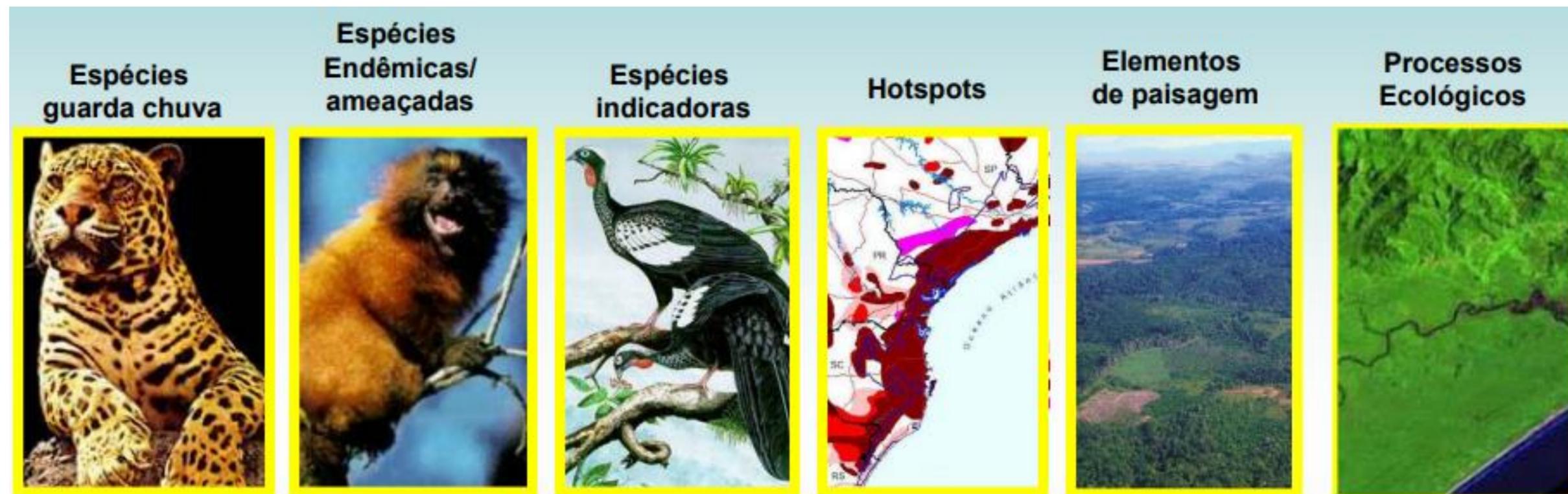


Representatividade

- As áreas selecionadas para conservação devem representar a diversidade da região
- **Alvo:** O que queremos preservar?
Ex: Bioma da Mata Atlântica
- **Meta:** Quanto queremos preservar?
Ex: 20 % dos remanescentes de Mata Atlântica

Representatividade

Exemplos de alvos de conservação



Hotspots: áreas com alta diversidade e grande pressão de impacto

Possingham, H., Wilson, K. A., Andelman, S. J. and Vynne, C. H. (2006). Protected areas: Goals, limitations, and design. In Martha J. Groom, Gary K. Meffe and C. Ronald Carroll (Ed.), *Principles of Conservation Biology* 3rd ed. ed. (pp. 507-549) Sunderland, Massachusetts, U.S.: Sinauer Associates.

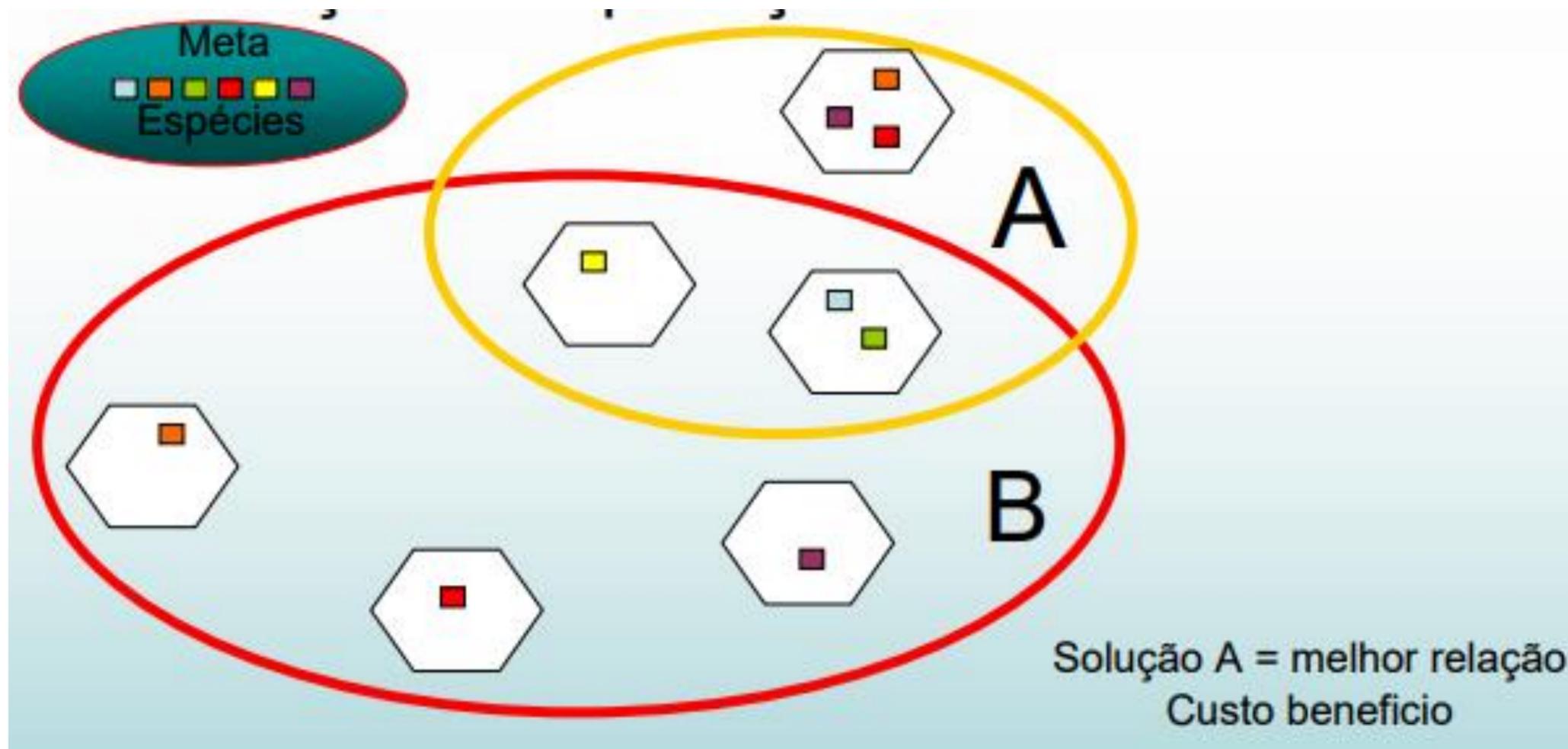
Vulnerabilidade

- Priorizar as áreas com maior probabilidade ou iminência da destruição ou alteração
- Parâmetros:
 - Espécies ameaçadas de extinção
 - Fragmentação
 - Taxa de desmatamento
 - Potencial agrícola



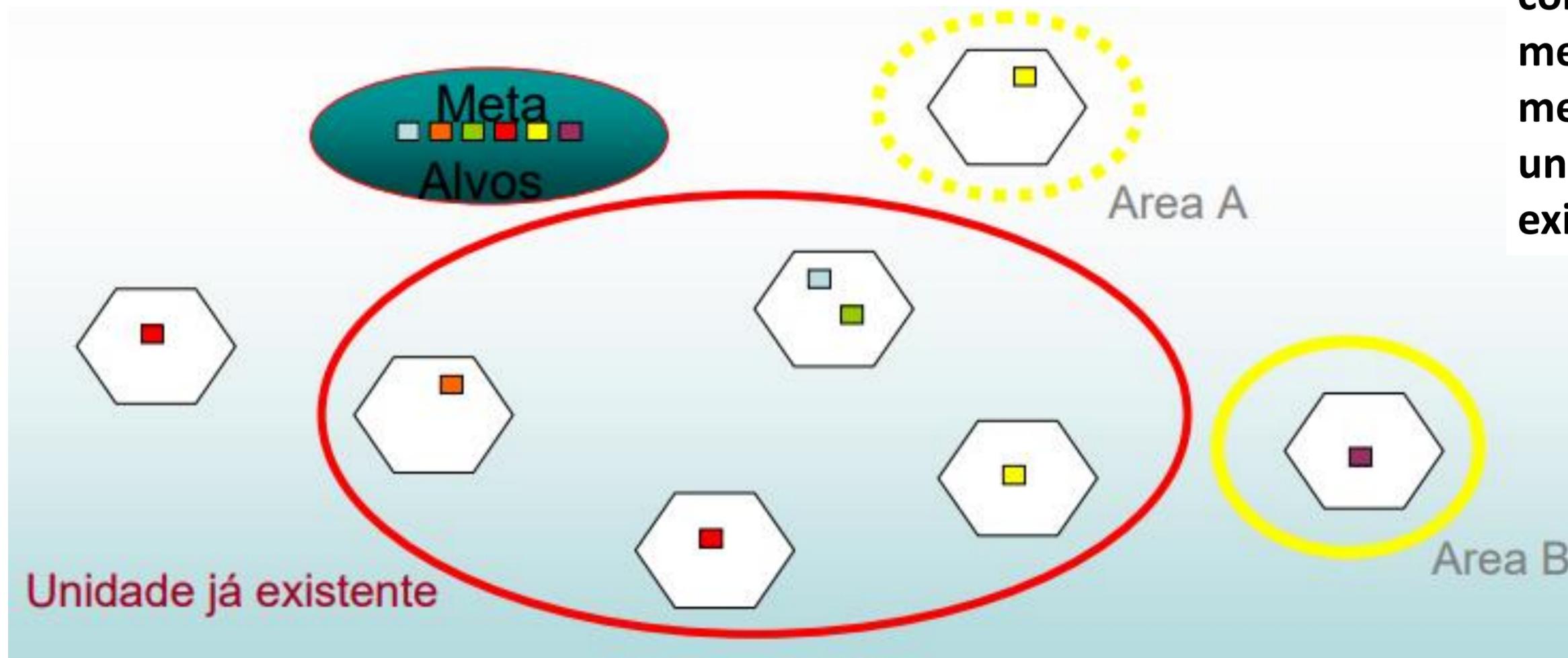
Eficiência

Máxima proteção da biodiversidade com o menor número de unidades e com a melhor relação área/proteção



Complementaridade

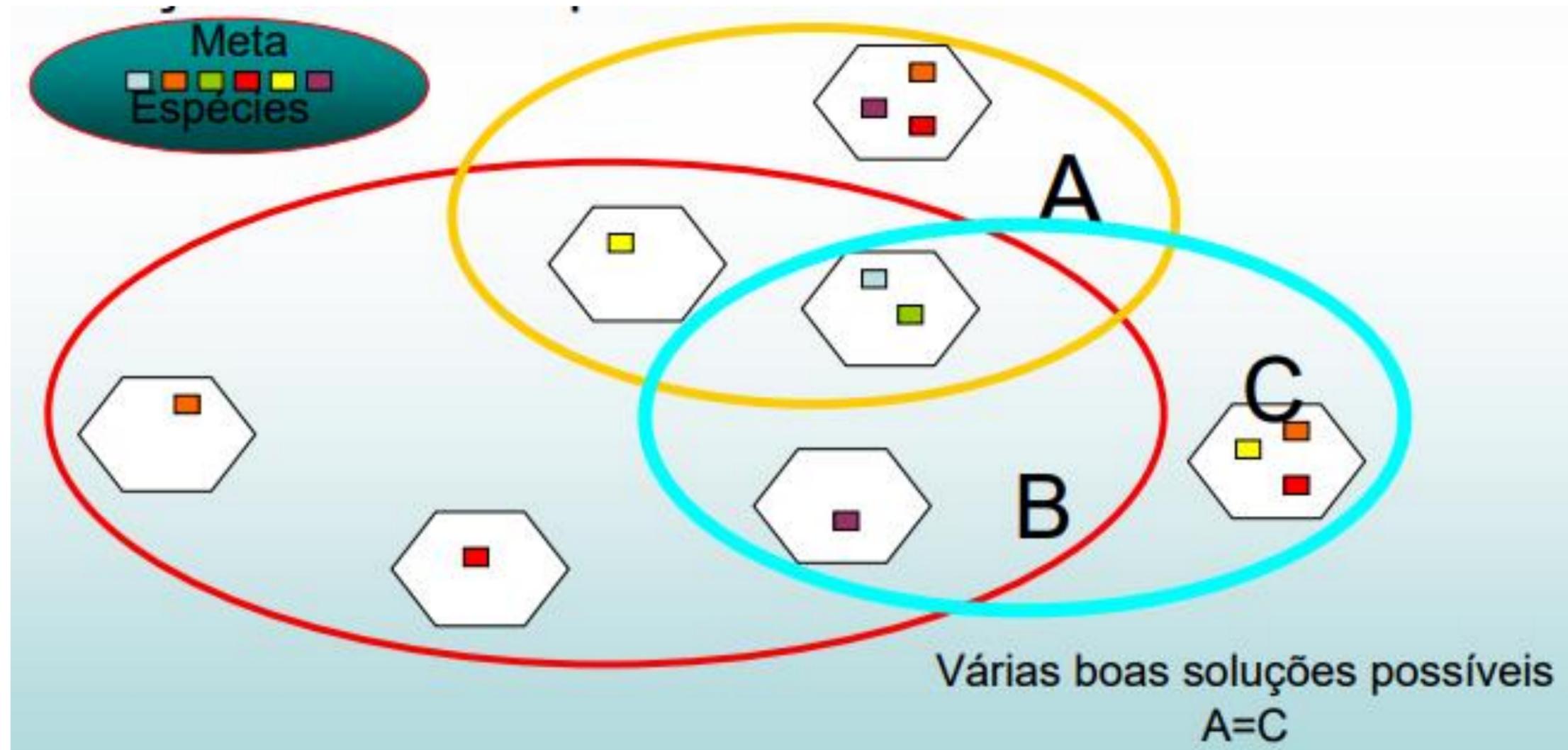
Incorporar novas áreas para maximizar o número de alvos/metastas de conservação atingidas



Área B
complementa
melhor as
metas com a
unidade já
existente

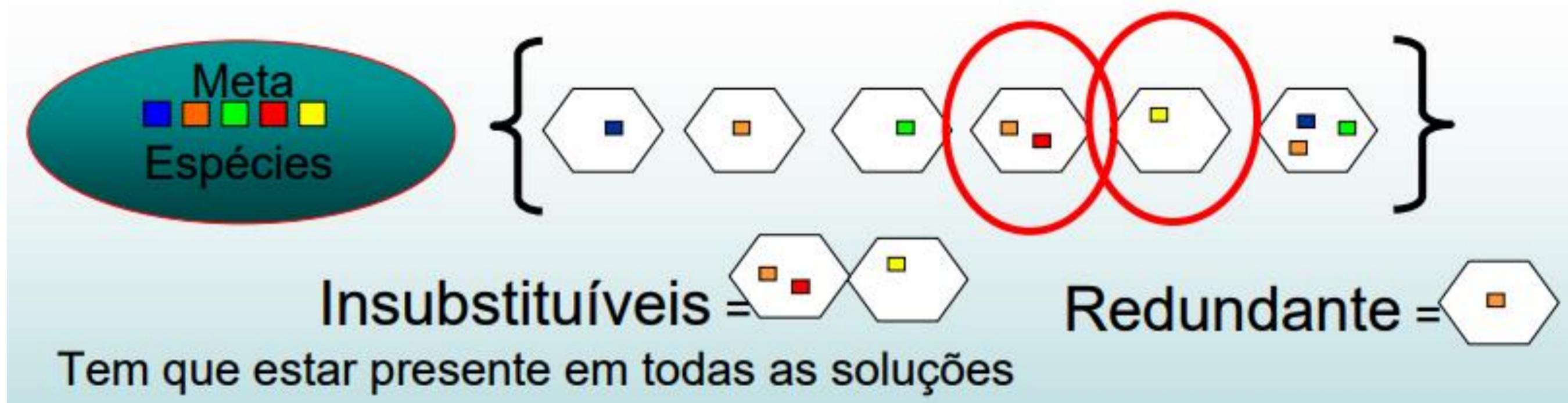
Flexibilidade

Metas de conservação podem ser atingidas por diversas combinações de áreas prioritárias



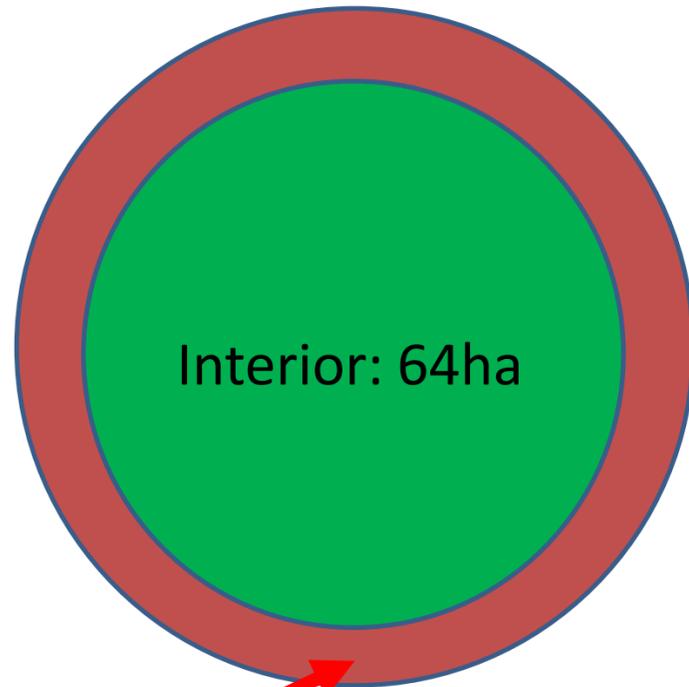
Insubstituibilidade

Probabilidade de uma determinada área ter de ser protegida para atingir um determinado conjunto de metas



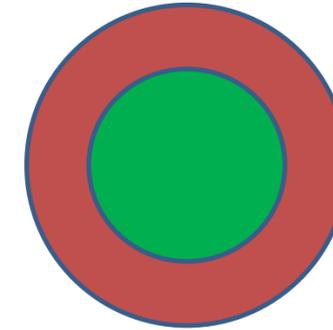
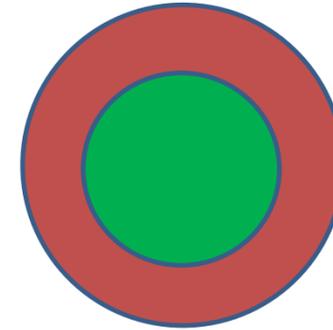
Compacidade

Melhor

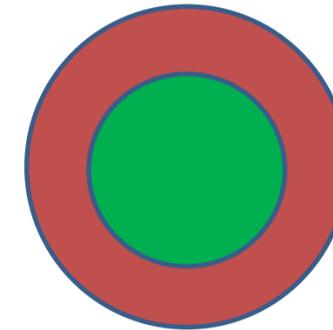
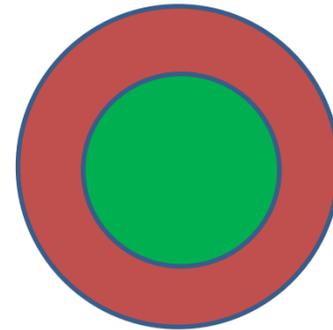


Total: 100 ha

**Quanto menor o
perímetro (borda), menos
efeito de borda**



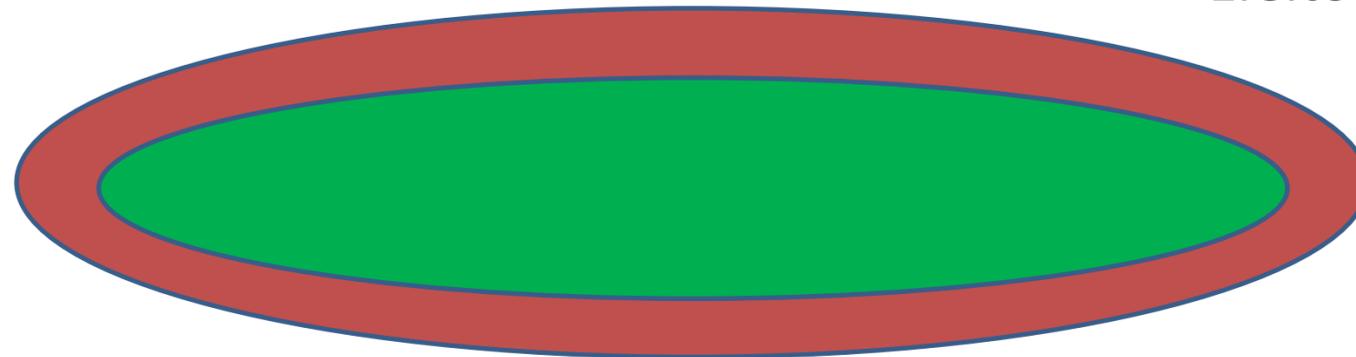
Pior



Interior: 34 ha
Efeito de Borda: 64 ha

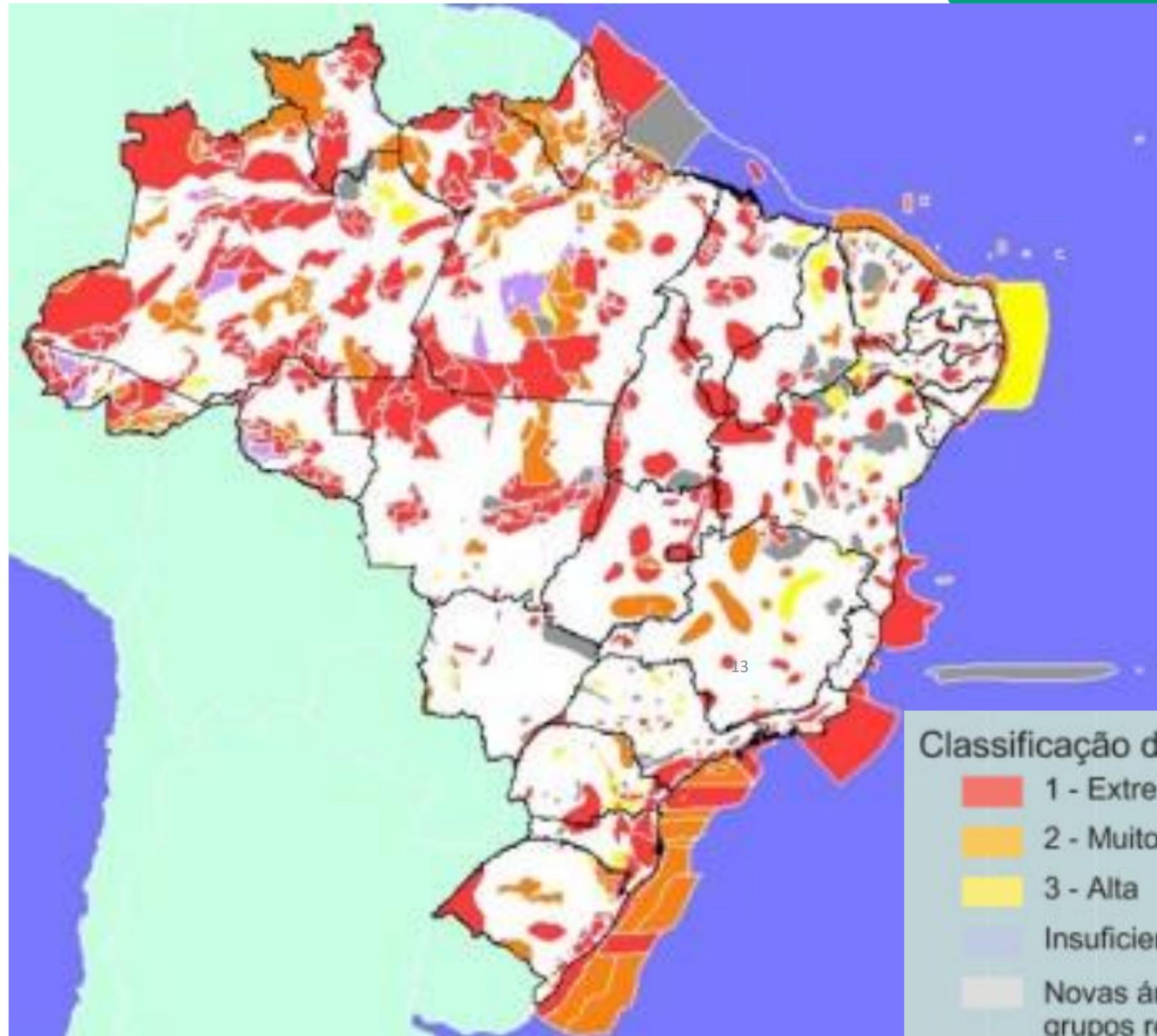
12

ou



Interior: 55 ha
Efeito de Borda: 45 ha

Áreas prioritárias para conservação (não-sistemático) - 2000

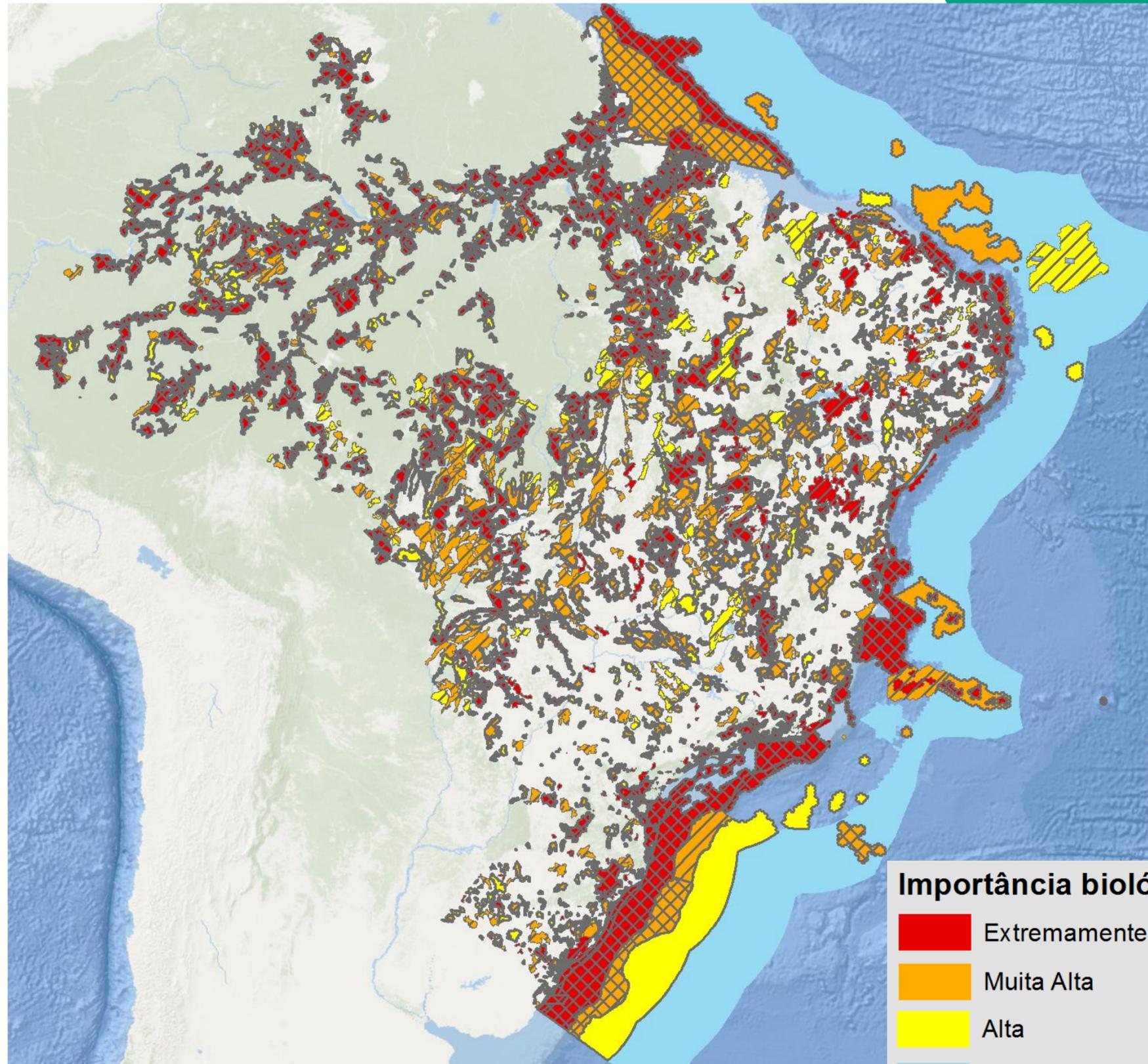


Baseado em
consultas a
pesquisadores

Classificação das áreas identificadas

- 1 - Extremamente alta
- 2 - Muito alta
- 3 - Alta
- Insuficientemente conhecida
- Novas áreas identificadas pelos grupos regionais (seminário da Amazônia)

Áreas prioritárias para conservação (sistemático) - 2018



Importância biológica

- Extremamente Alta
- Muita Alta
- Alta
- Insuficientemente conhecida

Prioridade de ação

- Extremamente Alta
- Muita Alta
- Alta

Questões de planejamento vs. Modelos

- Que áreas são insubstituíveis?
= biodiversidade não encontrada em outras áreas
 - C-Plan
- Quais as melhores áreas para conservar para se obter metas de conservação com o menor custo para a sociedade?
 - Marxan, Prioritizr
- Quais as melhores áreas para conservar, dado um custo máximo tolerável para a sociedade
 - Zonation, Marxan e Prioritizr

Prática com o Marxan

Acesse a página “Conservation Planning Exercise”

<https://marxansolutions.org/getting-started/>

0	0	0	0	0	0	0	0	1	0	0	0	89	0	12	30	48	0	69	4	9	0	0	0	0	0	0	0	0	0	0	0	91
\$347			\$52			\$985			\$207			\$276			\$821			\$122			\$404			\$300			\$681					
0	0	0	0	0	0	0	0	0	0	0	0	71	43	12	99	0	1	0	0	0	17	0	0	0	0	35	31	0	0	0	0	
\$813			\$537			\$931			\$653			\$919			\$826			\$455			\$983			\$731			\$875					
0	0	0	55	40	0	0	0	0	0	2	27	70	0	0	37	0	56	0	0	0	0	0	33	0	41	0	54	0	0	0	0	
\$247			\$462			\$287			\$988			\$85			\$736			\$681			\$479			\$459			\$615					
0	0	0	80	8	0	0	47	0	0	0	0	0	78	0	0	0	87	66	0	38	0	0	0	0	0	0	91	0	0	0	0	
\$378			\$986			\$887			\$392			\$526			\$783			\$224			\$149			\$268			\$90					
0	0	0	0	0	73	0	60	0	25	79	0	0	0	0	11	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	53	
\$977			\$74			\$53			\$390			\$619			\$773			\$952			\$738			\$897			\$580					
76	34	0	0	90	0	0	84	0	0	0	82	0	72	26	0	0	0	0	0	21	58	0	0	0	0	54	59	0	0	0		
\$969			\$76			\$147			\$870			\$350			\$543			\$607			\$375			\$903			\$790					
75	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	57	0	42	97	0	0	7	0	0	
\$729			\$492			\$303			\$289			\$490			\$599			\$407			\$651			\$709			\$365					
0	0	0	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	41	0	81	0	37	0	0	0	
\$571			\$931			\$353			\$64			\$955			\$950			\$855			\$886			\$840			\$598					
0	0	12	0	0	0	0	0	0	0	53	24	0	72	0	0	93	0	0	0	0	23	59	0	0	0	0	0	0	0	0	0	
\$422			\$252			\$941			\$152			\$353			\$123			\$716			\$587			\$346			\$318					
0	0	0	11	0	0	0	14	50	0	0	0	0	0	88	0	0	0	0	0	0	48	0	0	0	0	76	0	0	0	0	0	
\$682			\$891			\$815			\$818			\$726			\$372			\$197			\$89			\$417			\$975					

Features	Target	Current	Shortfall
A	267.4	0	267.4
B	251.2	0	251.2
C	243.0	0	243

Marxan Results:

Metas

Cost:		0
Boundary:	+	0
Shortfall Penalty:	+	781.6
Your Marxan Score:	=	781.6

Custo total

Once you meet your targets Marxan's results will appear here.

71 43 12
\$919

Quantidade de indivíduos das três espécies

Custo de implantação

Versão sem considerar efeito de borda

0 0 0	0 0 0	0 0 1	0 0 0	89 0 12	30 48 0	69 4 9	0 0 0	0 0 0	0 0 91
\$347	\$52	\$985	\$207	\$276	\$821	\$122	\$404	\$300	\$681
0 0 0	0 0 0	0 0 0	0 0 0	71 43 12	99 0 1	0 0 0	17 0 0	0 0 35	31 0 0
\$813	\$537	\$931	\$653	\$919	\$826	\$455	\$983	\$731	\$875
0 0 0	55 40 0	0 0 0	0 2 27	70 0 0	37 0 56	0 0 0	0 0 33	0 41 0	54 0 0
\$247	\$462	\$287	\$988	\$85	\$736	\$681	\$479	\$459	\$615
0 0 0	80 8 0	0 47 0	0 0 0	0 78 0	0 0 87	66 0 38	0 0 0	0 0 0	0 91 0
\$378	\$986	\$887	\$392	\$526	\$783	\$224	\$149	\$268	\$90
0 0 0	0 0 73	0 60 0	25 79 0	0 0 0	11 0 8	0 0 0	0 0 0	0 0 0	0 0 53
\$977	\$74	\$53	\$390	\$619	\$773	\$952	\$738	\$897	\$580
76 34 0	0 90 0	0 84 0	0 0 82	0 72 26	0 0 0	0 0 21	58 0 0	0 0 0	0 54 59
\$969	\$76	\$147	\$870	\$350	\$543	\$607	\$375	\$903	\$790
75 0 60	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	91 0 0	0 0 57	0 42 97	0 0 7
\$729	\$492	\$303	\$289	\$490	\$599	\$407	\$651	\$709	\$365
0 0 0	0 37 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 23 0	0 41 0	81 0 37
\$571	\$931	\$353	\$64	\$955	\$950	\$855	\$886	\$840	\$598
0 0 12	0 0 0	0 0 0	0 53 24	0 72 0	0 93 0	0 0 0	0 23 59	0 0 0	0 0 0
\$422	\$252	\$941	\$152	\$353	\$123	\$716	\$587	\$346	\$318
0 0 0	11 0 0	0 14 50	0 0 0	0 0 88	0 0 0	0 0 0	48 0 0	0 0 0	0 76 0
\$682	\$891	\$815	\$818	\$726	\$372	\$197	\$89	\$417	\$975

Features	Target	Current	Shortfall	Cost:	
A	267.4	273	0	Boundary:	+ 1846
B	251.2	270	0	Shortfall Penalty:	+ 3600
C	243.0	244	0	Your Marxan Score:	= 0
					= 5446

Marxan Results:

Marxan uses the formula above with Cost, Boundary and Shortfall Penalty to evaluate the affects of selecting or deselecting an area; this is called the Objective Function.

Spatial Arrangement

Unclumped:

Clumped:

[hide solution](#)

[show solution](#)

Total Cost

\$1775

\$3140

Marxan Score

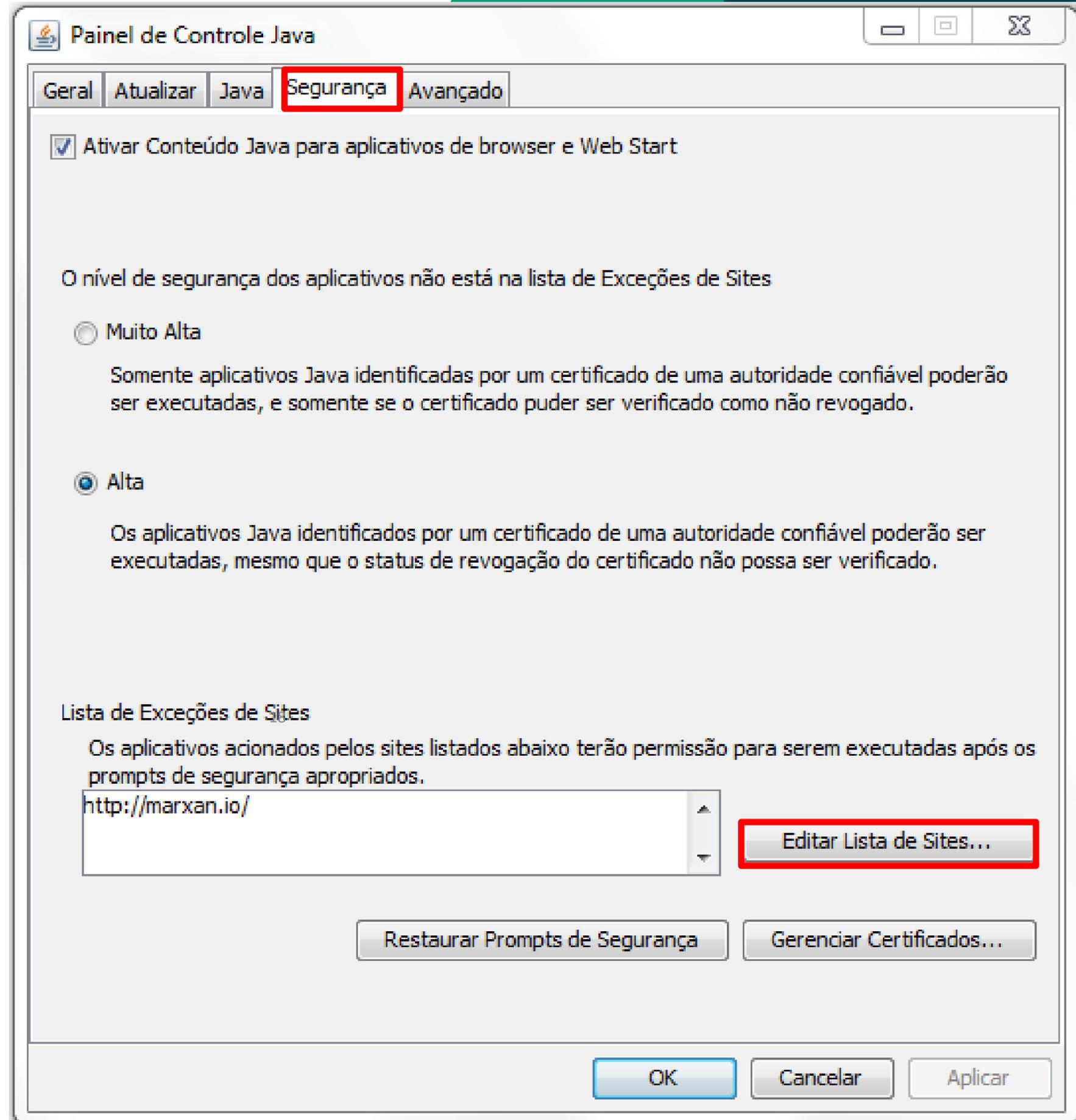
5175

5340

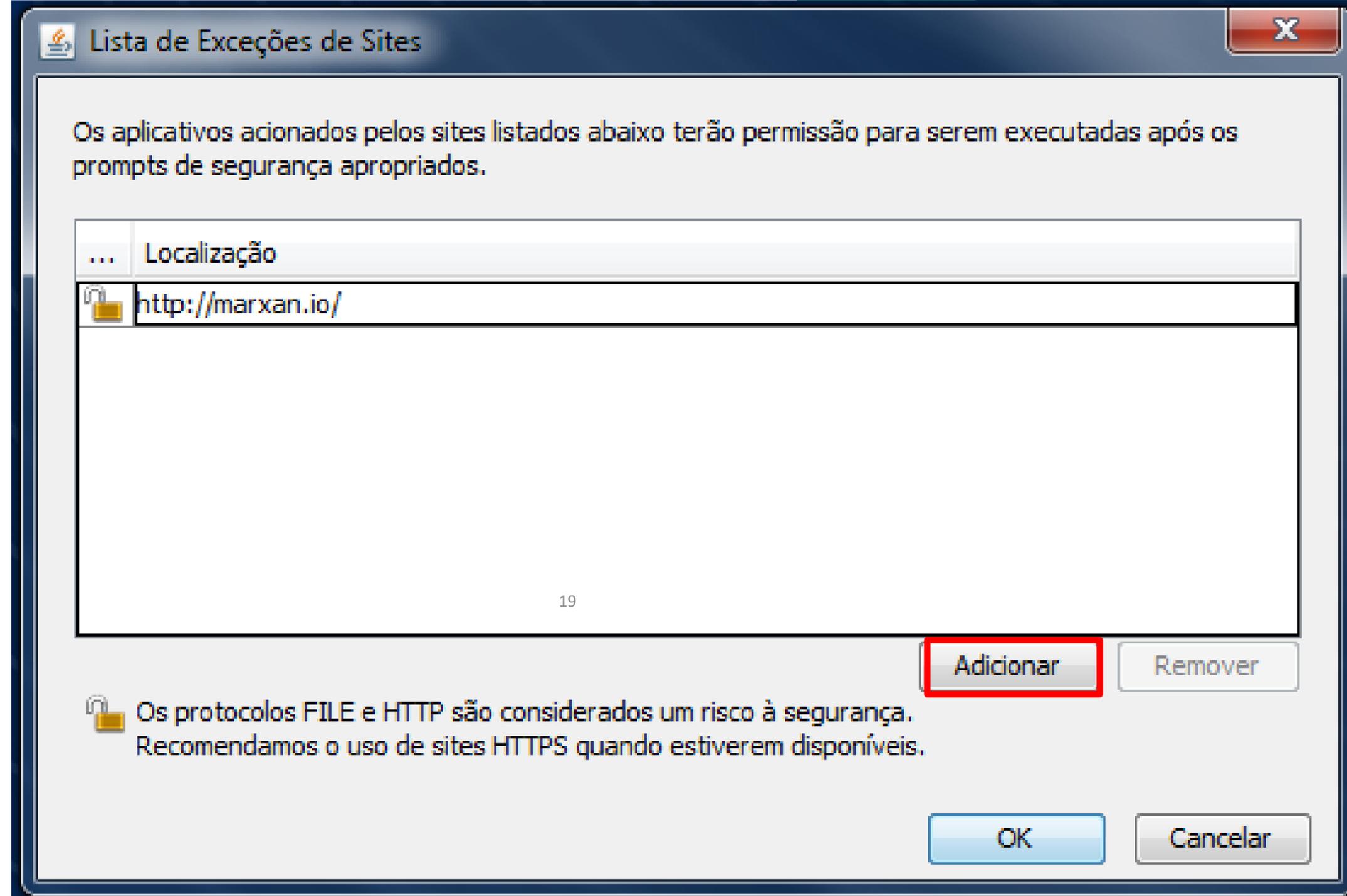
Reserve Design Game

resgame.jar

- Desenvolvido por Wayne Rochester em 2004
- Entre no aplicativo “Configurar Java” (Painel de Controle Java)
 - > Aba “Segurança”
 - > Editar lista de sites



- Adicionar -> <http://marxan.io/>



- Abra o aplicativo resgame.jar

resgame.jar

Reserve Design Game



Reserve design parameters

Iterations	<input type="text" value="1000"/>
Temperature	<input type="text" value="10.000000"/>
Cooling	<input type="text" value="0.99"/>
BLM	<input type="text" value="0"/>
CFPF	<input type="text" value="1"/>
Algorithm	<input type="text" value="Annealing"/>

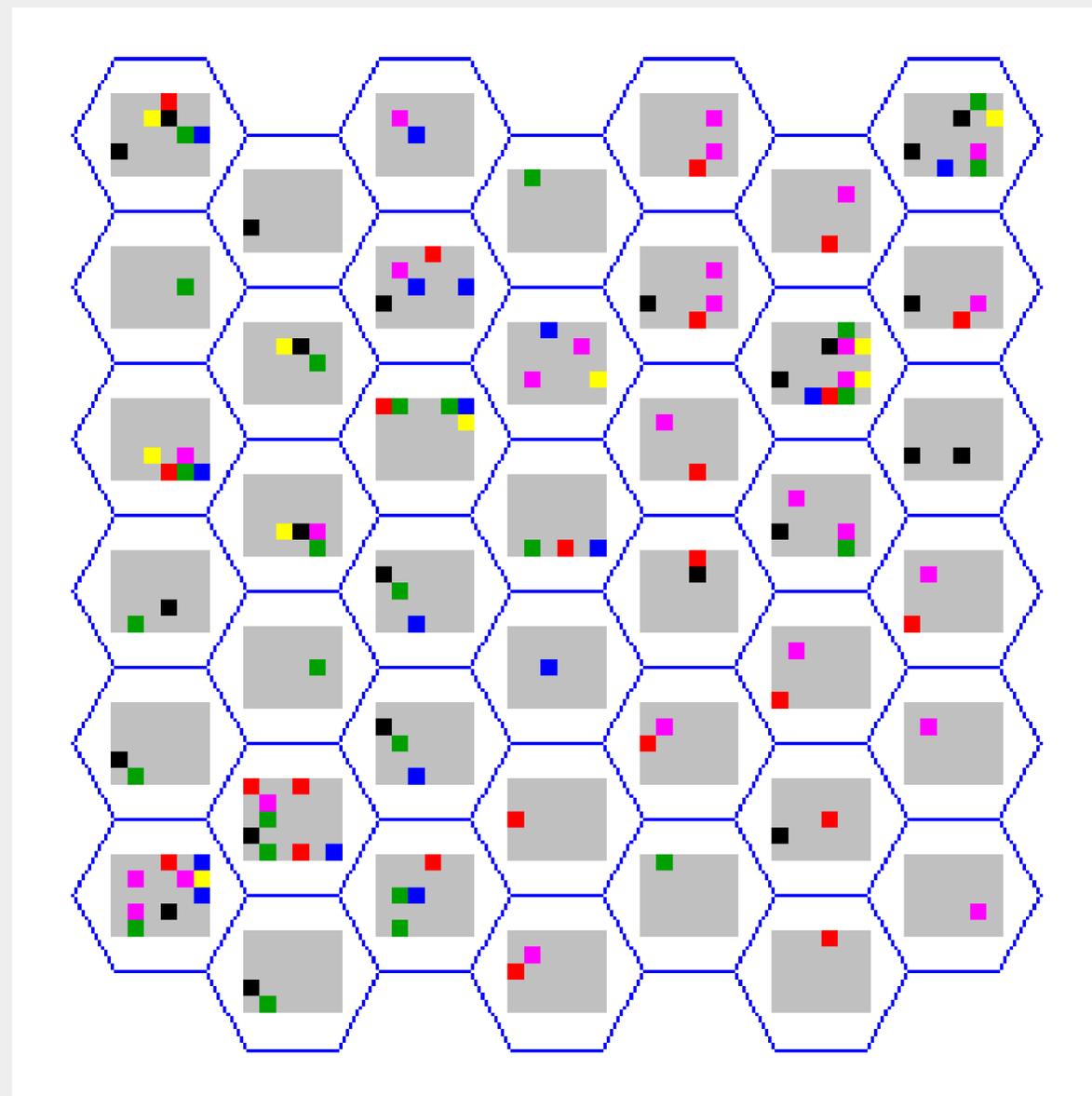
Penalidade por borda

Penalidade por não atingir meta

Reserve system attributes

Unidades conservadas	Iteration	0
Custo	Selected PUs	0
	Cost	0.00
	Boundary	0.00
Espécies conservadas	Features	0
Penalidade por não atingir meta	Feat. penalty	77.94
Pontuação final	Objective	77.94

<input type="button" value="Start/stop"/>	<input type="button" value="Step"/>
<input type="button" value="Recalculate"/>	<input type="button" value="Clear"/>



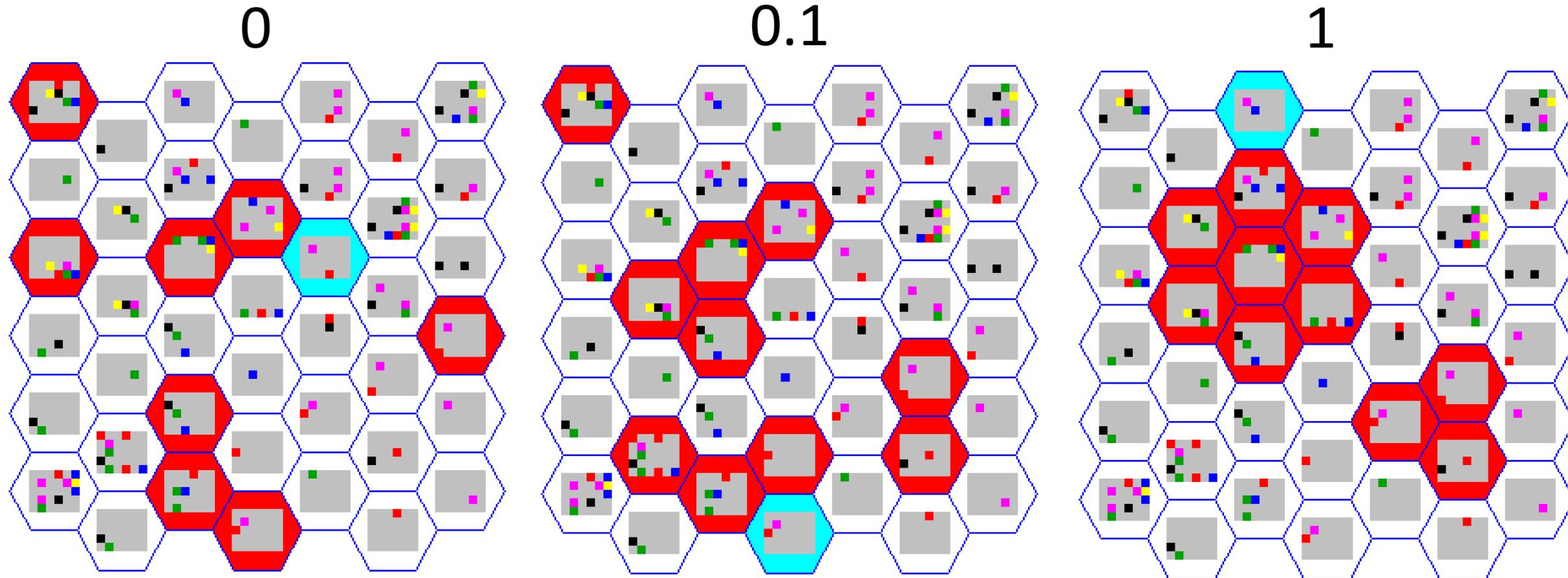
Feature scores

0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Velocidade

Frame rate

BLM – Boundary Layer Modifier



22

Reserve system attributes	
Iteration	500
Selected PUs	8
Cost	20.78
Boundary	42.00
Features	28
Feat. penalty	5.20
Objective	25.98

Reserve system attributes	
Iteration	500
Selected PUs	10
Cost	25.98
Boundary	46.00
Features	30
Feat. penalty	0.00
Objective	30.58

Reserve system attributes	
Iteration	500
Selected PUs	10
Cost	25.98
Boundary	30.00
Features	30
Feat. penalty	0.00
Objective	55.98

- Abra o aplicativo resgame_ws.jar

Reserve Design Workshop Game

Reserve system attributes

Selected PUs	0
Cost	0.00
Boundary	0.00
Features	0
Feat. penalty	77.94
Objective	84.18
Solution	sum

One solution

Summed solution

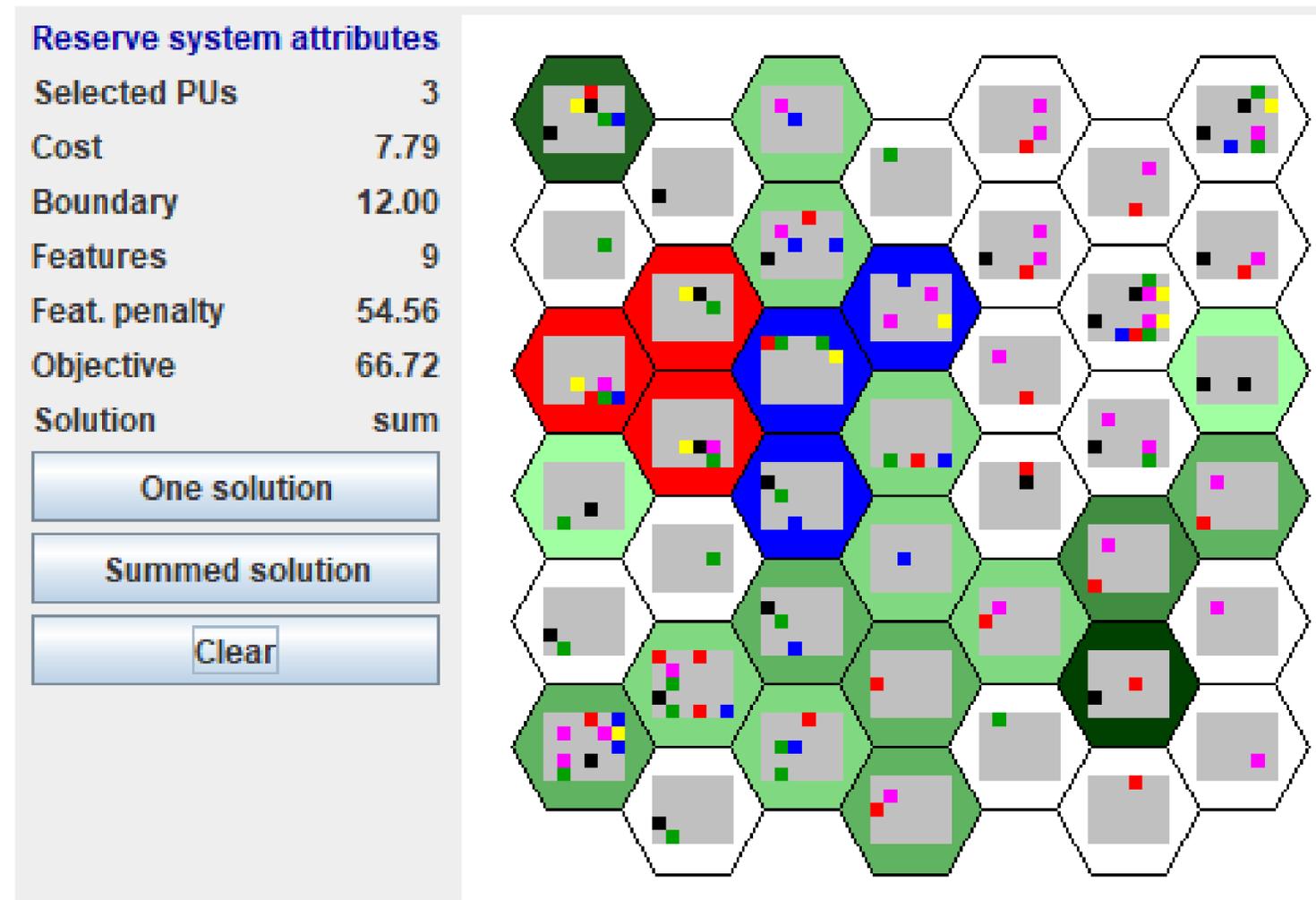
Clear

Feature scores

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Contexto Participativo

Em uma oficina, foi negociado com entre ambientalistas, moradores, governo e produtores rurais um consenso sobre algumas das áreas para conservação, e sobre a exclusão de outras áreas. Clique nos quadrantes para marcar a conservação (vermelho) e exclusão (azul).

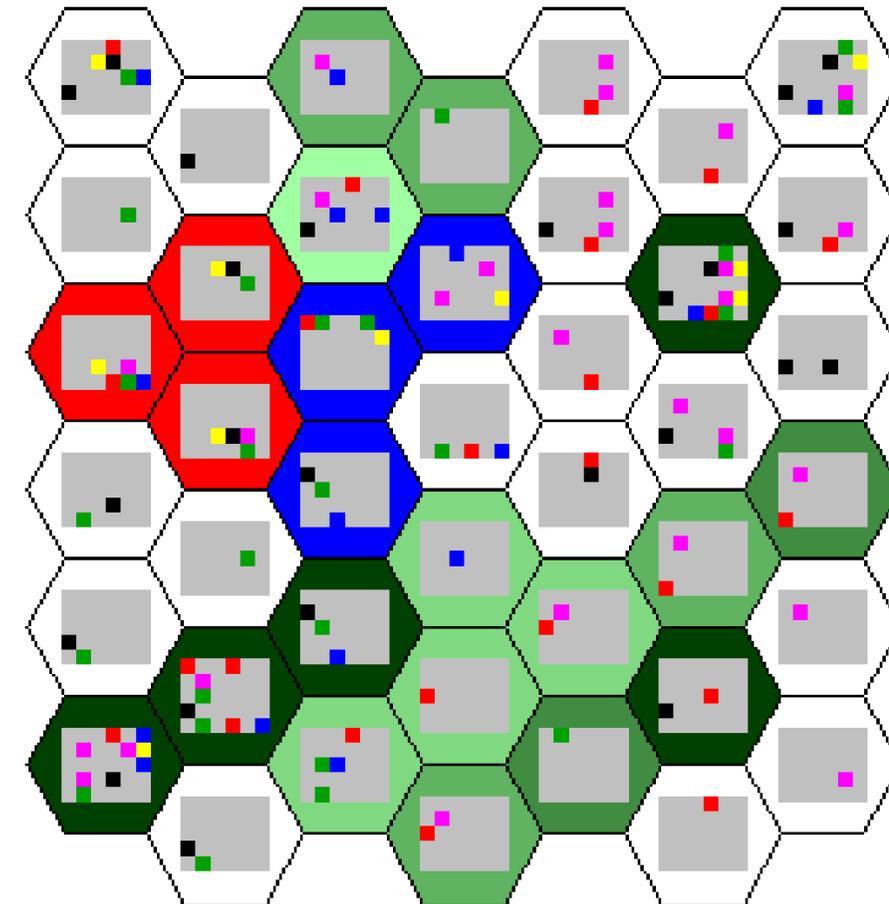
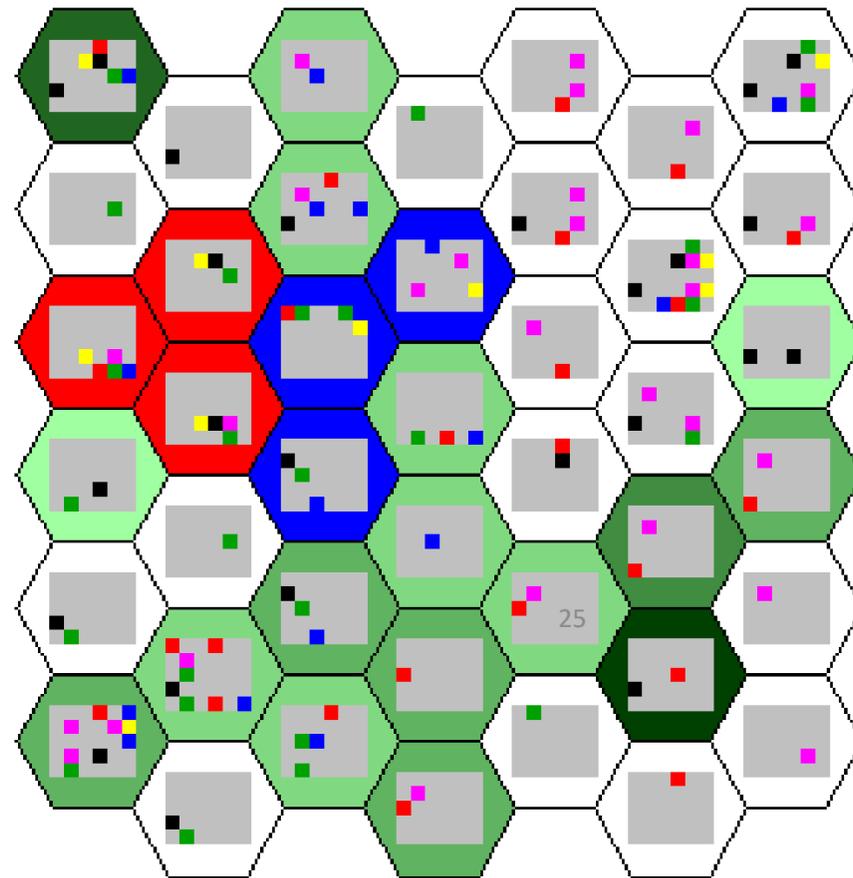


- Clique em Summed Solution

Novo resultado

Reserve system attributes

Selected PUs	3
Cost	7.79
Boundary	12.00
Features	9
Feat. penalty	54.56
Objective	66.72
Solution	sum



- Complete as demais unidades de conservação (do verde mais escuro para o mais claro), transformando-as em vermelho, até atingir a meta de conservação (*Feature penalty* = 0), ou até atingir o menor resultado possível (*Objective*)
- Observe o que ocorre com os resultados do modelo a cada passo

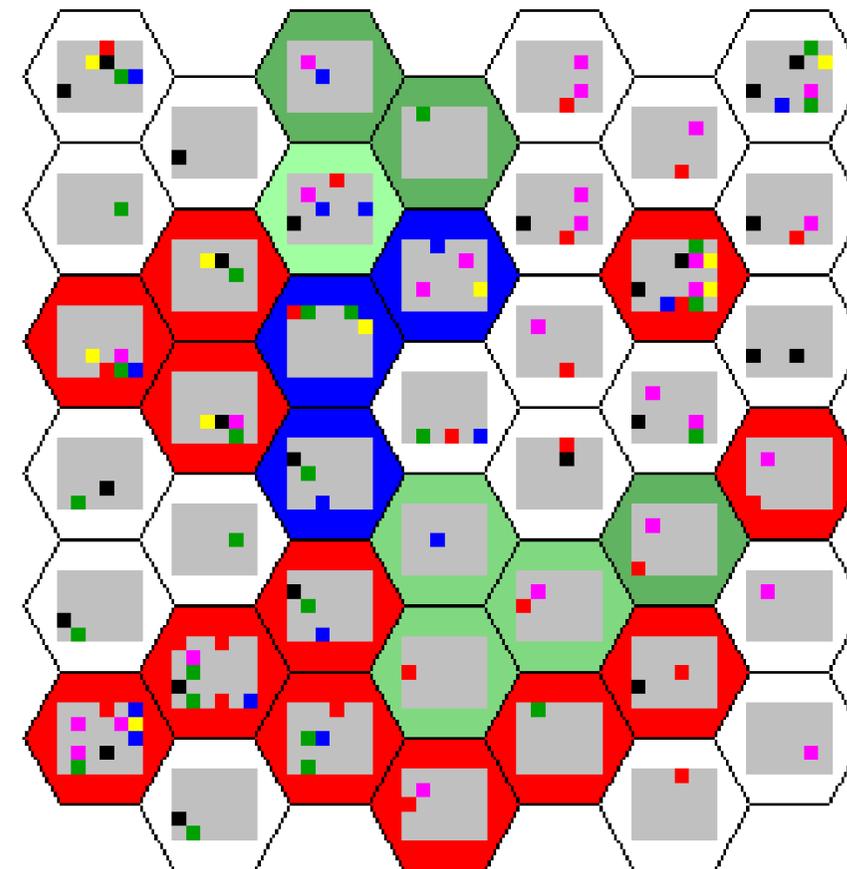
Resultado

Reserve system attributes	
Selected PUs	12
Cost	31.18
Boundary	52.00
Features	29
Feat. penalty	2.60
Objective	33.98
Solution	sum

One solution

Summed solution

Clear



Atividade Prática -

CLUZ

- Adaptado de <https://anotherbobsmith.wordpress.com/software/cluz/>

- Dica antes de começar: alterar as configurações de formato numérico do Windows para o formato americano.



Settings

Home

Find a setting

Time & Language

- Date & time
- Region
- Language
- Speech

Region

Brazil

Windows and apps might use your country or region to give you local content.

Regional format

Current format: English (United States)

English (United States)

Windows formats dates and times based on your language and regional preferences.

Regional format data

Select Change data formats to switch among calendars, date, and time formats supported by the region.

Calendar:	Gregorian Calendar
First day of week:	Sunday
Short date:	25-Feb-24
Long date:	Sunday, February 25, 2024
Short time:	12:16 PM
Long time:	12:16:33 PM

[Change data formats](#)

[Additional date, time & regional settings](#)

[Sync your settings](#)

[Get help](#)

[Give feedback](#)

 Clock and Region

  > Control Panel > Clock and Region

Control Panel Home

System and Security

Network and Internet

Hardware and Sound

Programs

User Accounts

Appearance and
Personalization

● **Clock and Region**

Ease of Access



Date and Time

[Set the time and date](#) | [Change the time zone](#) | [Add clocks for different time zones](#)



Region

[Change date, time, or number formats](#)



Formats Administrative

Format:

English (United States)

[Language preferences](#)

Date and time formats

Short date: dd-MMM-yy

Long date: dddd, MMMM d, yyyy

Short time: h:mm tt

Long time: h:mm:ss tt

First day of week: Sunday

Examples

Short date: 25-Feb-24

Long date: Sunday, February 25, 2024

Short time: 12:19 PM

Long time: 12:19:01 PM

Additional settings...

OK

Cancel

Apply



Numbers Currency Time Date

Example
Positive: 123,456,789.00 Negative: -123,456,789.00

- Decimal symbol: .
- No. of digits after decimal: 2
- Digit grouping symbol: ,
- Digit grouping: 123,456,789
- Negative sign symbol: -
- Negative number format: -1.1
- Display leading zeros: 0.7
- List separator: ,
- Measurement system: U.S.
- Standard digits: 0123456789
- Use native digits: Never

Ponto
Vírgula
Vírgula

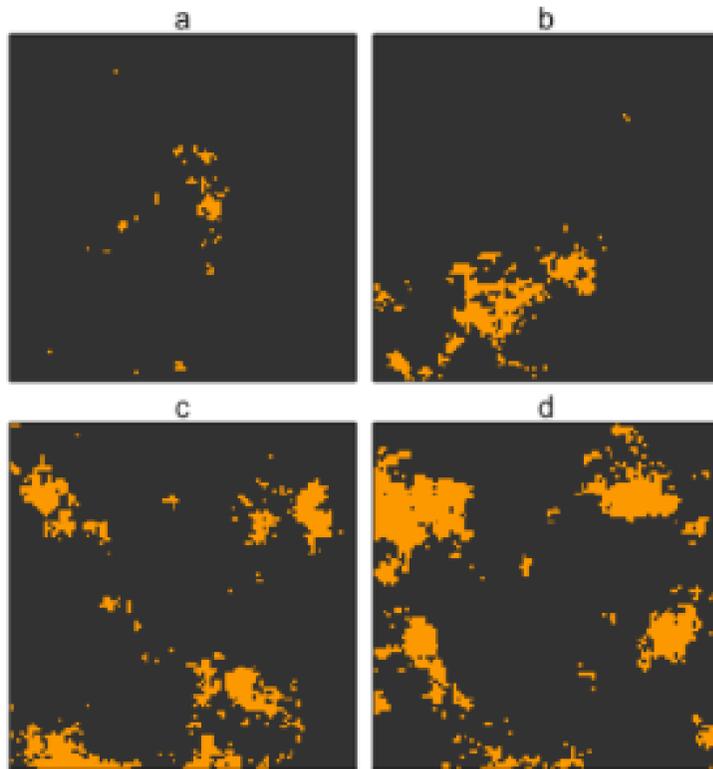
Click Reset to restore the system default settings for numbers, currency, time, and date.

Reset

OK Cancel Apply

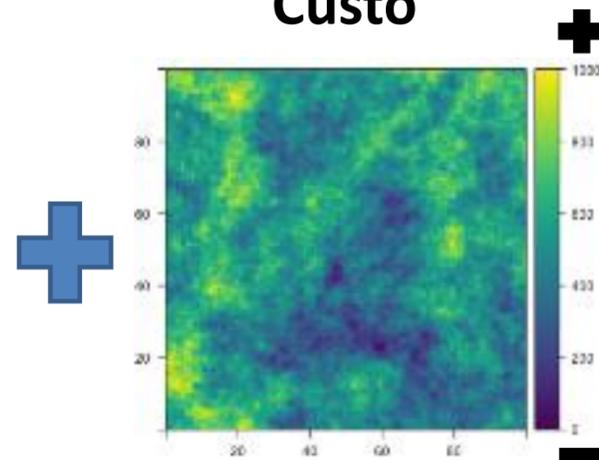
Marxan

Distribuição dos alvos de conservação



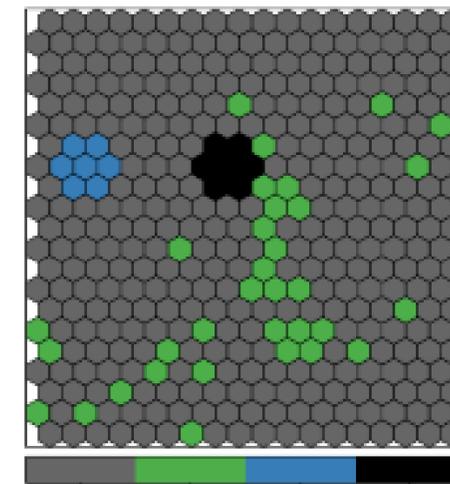
- Meta de conservação: 20%
- Custo para os serviços ecossistêmicos por % de meta não atingida

Custo

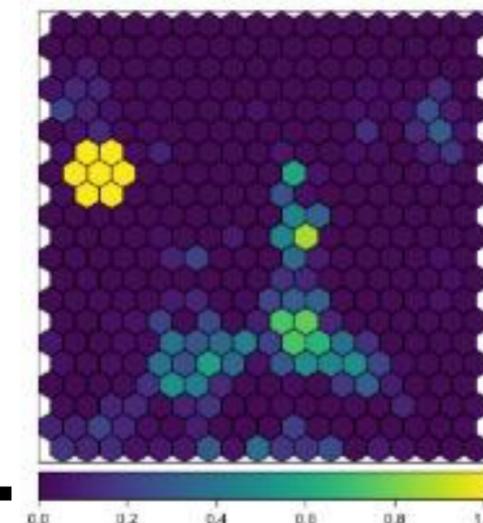


- Custo de aquisição
- Custo de gestão
- Custo de atividade econômica alternativa (pesca, agricultura, etc.)

Melhor alternativa



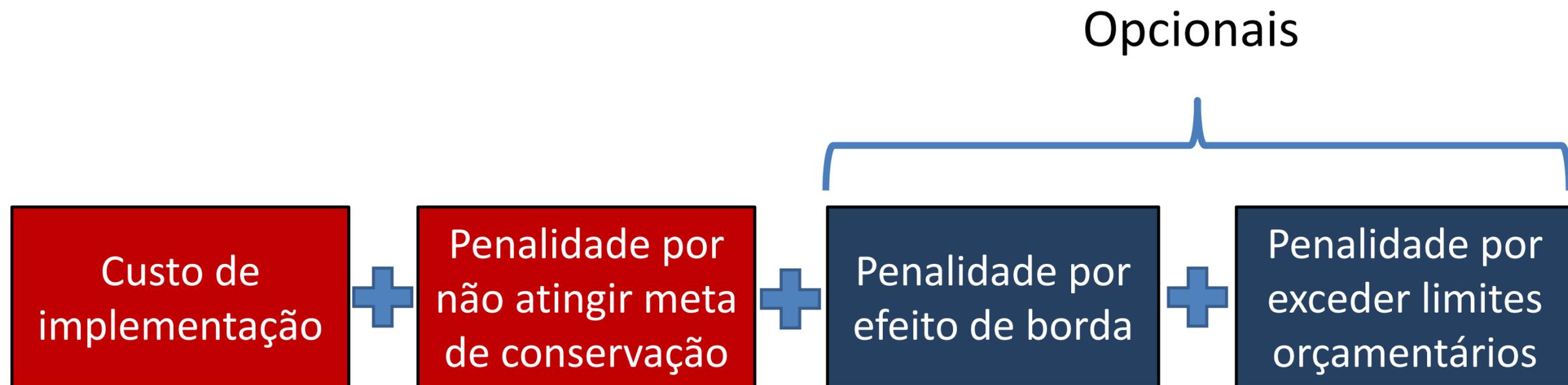
Não preservado
A preservar
Já preservado
Não preservável



Frequência das 100 melhores alternativas

Marxan

Análise de custo-benefício:



Ambientes do Marxan

- Aplicativo DOS
- QMarxan Toolbox
 - Complemento do QGIS para editar os dados de entrada
- CLUZ
 - Complemento do QGIS para analisar os resultados
- Zonae Cogito
 - Editar dados de entrada e visualizar os resultados
- Marxan Planning
 - Aplicativo Web

Partes

- 1. Análise manual**
- 2. Análise sistemática**

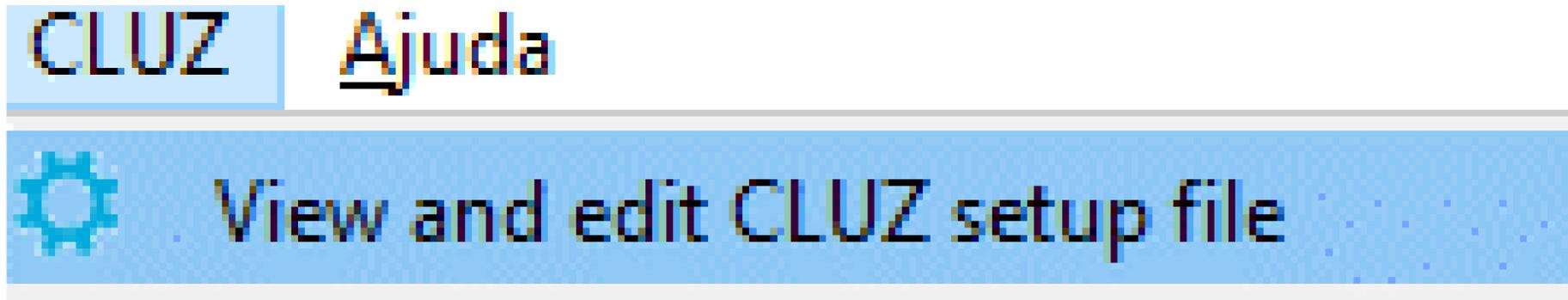
- Abra o QGIS Desktop
- Menu Complementos -> Gerenciar e Instalar Complemento



- Instalar complementos “CLUZ3”



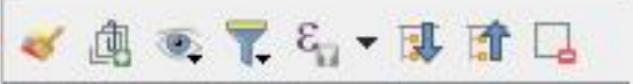
- Menu “CLUZ” → View and edit CLUZ setup file



Faça as configurações abaixo, clique em “Save as...” e grave o arquivo “marxan.clz” na pasta com os demais arquivos da aula. Depois clique em “Close”

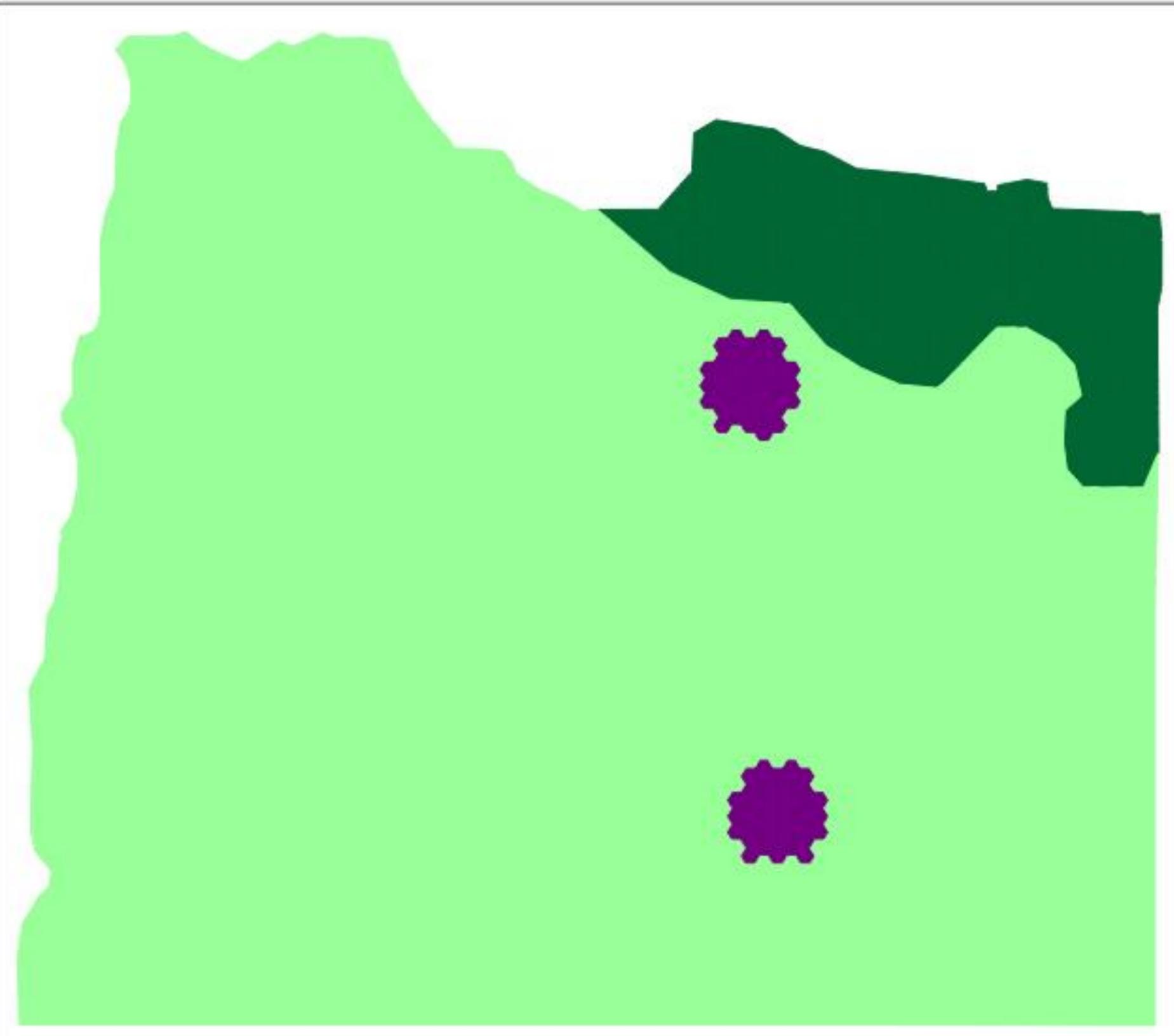
Analysis type	<input checked="" type="radio"/> Marxan	<input type="radio"/> Marxan with Zones	
Marxan location	<input type="text" value="C:\marxan\Marxan_v406\Marxan_x64.exe"/>		<input type="button" value="Browse..."/>
Input directory	<input type="text" value="C:\marxan\input"/>		<input type="button" value="Browse..."/>
Output directory	<input type="text" value="C:\marxan\output"/>		<input type="button" value="Browse..."/>
Planning unit theme	<input type="text" value="C:\marxan\planning units.shp"/>		<input type="button" value="Browse..."/>
Target table	<input type="text" value="C:\marxan\targets.csv"/>		<input type="button" value="Browse..."/>
Decimal places for numbers in Abundance and Target tables			<input type="text" value="3"/>
Setup file location: blank			
<input type="button" value="Save"/> <input type="button" value="Load"/> <input type="button" value="Save As..."/> <input type="button" value="Close"/>			

Camadas 



 **Planning units**

-  Available
-  Earmarked
-  Conserved
-  Excluded



Arquivo target.csv

Id	Name	Type	Target	Spf	Ear+Cons	Total	PC_target
1	Montane_aquatic	1	244,2625	10	0	1221,302	0
2	Rock_faces	1	158,025	10	0	790,123	0
3	Montane_grassland	2	136,025	10	0	340,062	0
4	Montane_woodland	1	4919,6125	10	0	24598,204	0
5	Montane_thicket	1	2055,7875	10	0	10278,94	0
6	Montane_forest	2	70,025	10	0	175,06	0
8	Acacia_woodland	1	1356,1625	10	1133,994	6780,803	83,618
9	Acacia_thicket	1	2020,125	10	2905,997	10100,617	143,852
11	Floodplain_grassland	2	1752,95	10	1399,376	4382,378	79,83
12	Reed_beds	2	655,7	10	925,871	1639,24	141,203
13	Riverine_thicket	2	589,375	10	418,568	1473,435	71,019
14	Riverine_forest	2	442,7	10	814,62	1106,741	184,012
18	Terminalia_woodland	1	1957,35	10	1545,001	9788,494	78,933
19	Woodland_on_red_sand	1	345,6	10	410,25	1727,999	118,707
21	Sand_forest	2	388,075	10	1,813	970,315	0,467
30	Subsistence_agriculture	0	0	10	752,937	32468,3349999999	-1
31	Commercial_agriculture	0	0	10	0	894,439	-1
33	Open_water	1	356,675	10	556,436	1783,374	156,006
105	F_splendens	3	2000	10	0	10784,516	0
107	A_gigantica	3	2000	10	0	4446,389	0
156	Vulture_nest	3	20	10	11	34	55

- Na barra de ferramentas do CLUZ, clique no ícone de Alvo (Target)



Id	Name	Type	Target	Spf	Ear+ Cons	Total	PC_target
1	Montane_aquatic	1	244.262	10	0.0	1221.302	0.000
2	Rock_faces	1	158.025	10	0.0	790.123	0.000
3	Montane_grassland	2	136.025	10	0.0	340.062	0.000
4	Montane_woodland	1	4919.613	10	0.0	24598.204	0.000
5	Montane_thicket	1	2055.787	10	0.0	10278.94	0.000
6	Montane_forest	2	70.025	10	0.0	175.06	0.000
8	Acacia_woodland	1	1356.162	10	1133.994	6780.803	83.618
9	Acacia_thicket	1	2020.125	10	2905.997	10100.617	143.852
11	Floodplain_grassland	2	1752.95	10	1399.376	4382.378	79.830
12	Reed_beds	2	655.7	10	925.871	1639.24	141.203
13	Riverine_thicket	2	589.375	10	418.568	1473.435	71.019
14	Riverine_forest	2	442.7	10	814.62	1106.741	184.012
18	Terminalia_woodland	1	1957.35	10	1545.001	9788.494	78.933
19	Woodland_on_red_sands	1	345.6	10	410.25	1727.999	118.707
21	Sand_forest	2	388.075	10	1.813	970.315	0.467
30	Subsistence_agriculture	0	0.0	10	752.937	32468.335	-1
31	Commercial_agriculture	0	0.0	10	0.0	894.439	-1
33	Open_water	1	356.675	10	556.436	1783.374	156.006
105	F_splendens	3	2000.0	10	0.0	10784.516	0.000
107	A_gigantica	3	2000.0	10	0.0	4446.389	0.000
156	Vulture_nest	3	20.0	10	11.0	34.0	55.000

Arquivo puvspr2.dat, na pasta "input"

```
species,pu,amount
```

```
30,1,6.938
```

```
18,2,5.125
```

```
30,2,6.375
```

```
18,3,11.375
```

```
18,4,0.25
```

```
30,4,1.188
```

```
11,5,1.812
```

```
18,5,12.438
```

```
30,5,10.375
```

```
18,6,20.688
```

```
30,6,4.0
```

```
18,7,6.938
```

```
11,8,4.875
```

```
12,8,5.438
```

```
18,8,1.562
```

- Selecione o botão de Abundância



- Selecione uma ou mais metas e aperte "Ok"

Select features for Abundance table



written by
Bob Smith



funded by



Display all or select conservation features to display in abundance table

- 1 - Montane_aquatic
- 2 - Rock_faces
- 3 - Montane_grassland
- 4 - Montane_woodland
- 5 - Montane_thicket
- 6 - Montane_forest
- 8 - Acacia_woodland
- 9 - Acacia_thicket
- 11 - Floodplain_grassland
- 12 - Reed_beds
- 13 - Riverine_thicket
- 14 - Riverine_forest
- 18 - Terminalia_woodland
- 19 - Woodland_on_red_sands
- 21 - Sand_forest
- 30 - Subsistence_agriculture
- 31 - Commercial_agriculture
- 33 - Open_water
- 105 - F_splendens
- 107 - A_gigantica
- 156 - Vulture_nest

OK

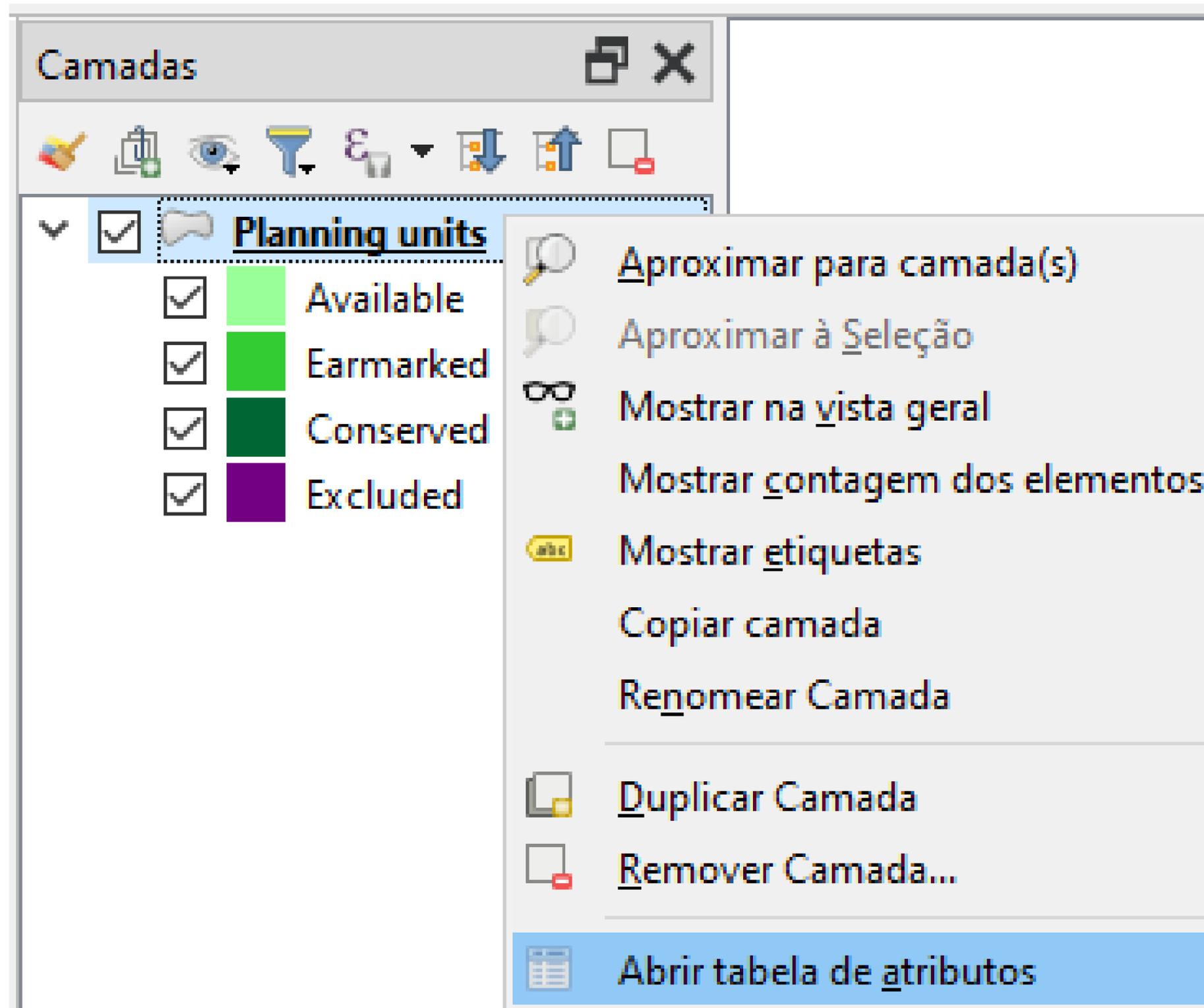
Cancel



Abundance table

PU_ID	F_1	F_2	F_3	F_4	F_5	F_6	F_8	F_9	F_11	F_12
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.812	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.875	5.438

- Clique com o botão direito na camada “Planning units” e escolha a opção “abrir tabela de atributos”



- Na tabela de atributos, clique no botão de “Selecionar por expressão”



Planning units — Total de feições: 4661, Filtrado: 4661, Selecionado: 0

	Unit_ID	Area	Cost	Status	Previous
1	1	7,04	7,04	Conserved	0
2	2	11,67	11,67	Conserved	0
3	3	11,53	11,53	Conserved	0
4	4	1,35	1,35	Conserved	0

- Na pasta de “Campos e Valores”, dê um duplo clique no atributo “Previous”
- Escreva a expressão “Previous” = 1

Planning units — Selecionar Por Expressão

Expressão Editor de Funções

Ícones de manipulação de arquivos: Novo, Salvar, Copiar, Colar, Excluir, Baixar, Enviar para cima.

Expressão: `"Previous" = 1`

Campos e Valores:

- Camadas do mapa
- Campos e Valores
 - feature
 - geometry
 - id
 - NULL
 - 123 Unit_ID
 - 1.2 Area
 - 1.2 Cost
 - abc Status
 - 123 Previous**
 - abc Best
 - 123 SF Score

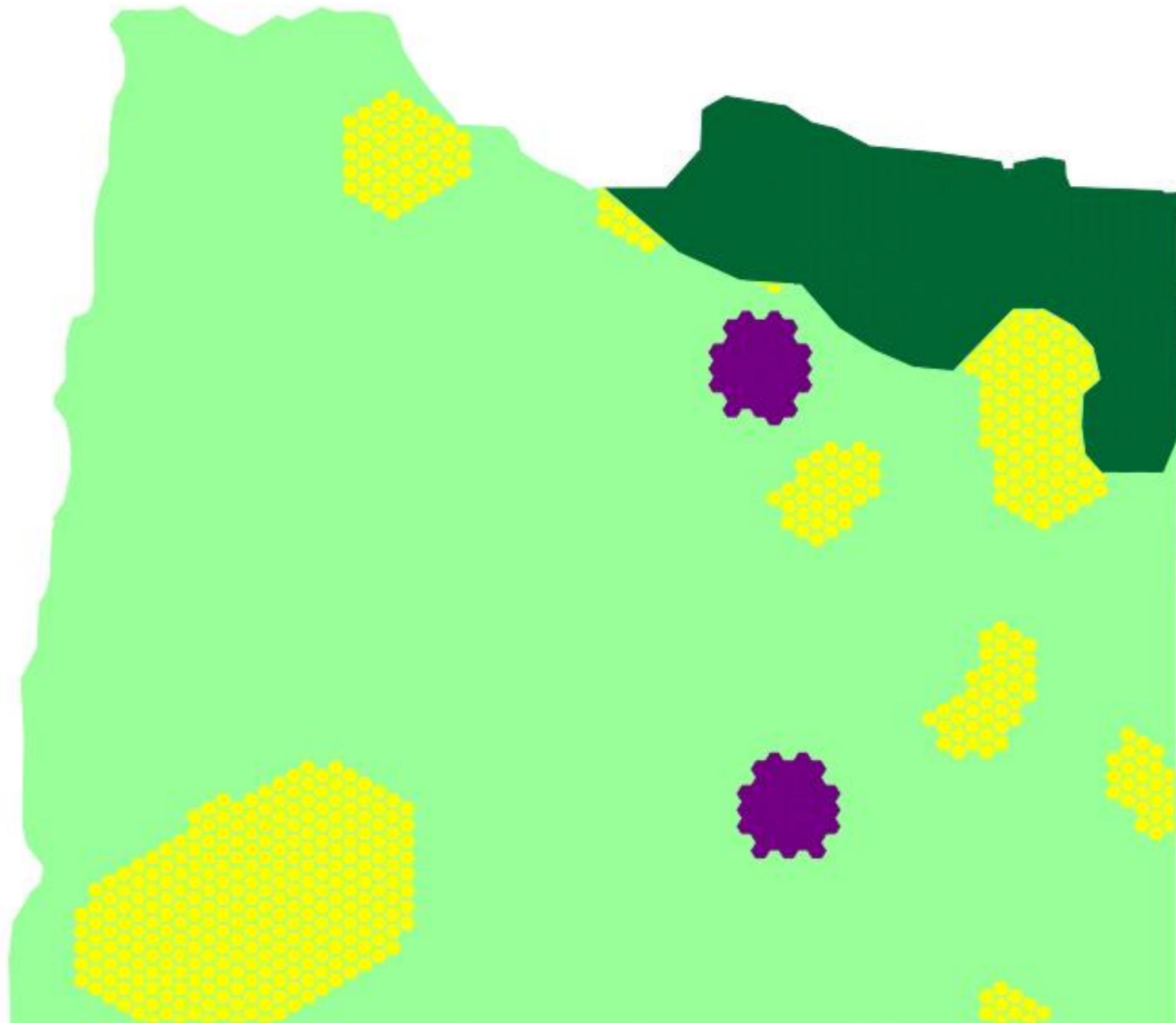
grupo field

Clique duplo para adicionar o nome do campo à cadeia de caracteres da expressão.
Clique com o botão direito do rato no

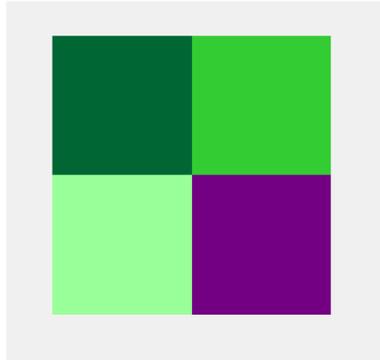
Valores: Buscar...

Único 10 Amostras

Ajuda Selecionar Feições Fechar



- Clique no botão “Change unit and status”



- Escolha a opção “Set as Earmarked”
- Observe a mudança nas metas (targets) atingidos

Change Status panel

Set as Available

Set as Earmarked

Allow changes to Conserved and Excluded status

Set as Conserved

Set as Excluded

Targets met: 5 of 19

Change Undo

Camadas

Planning units

- Available
- Earmarked
- Conserved
- Excluded



- Menu “Display distribution of conservation features”

CLUZ Ajuda

-  View and edit CLUZ setup file
-  Create initial CLUZ files
-  Convert polyline or polygon themes to Marxan abundance data
-  Convert raster layer to Marxan abundance data
-  Import fields from table to Marxan abundance file
-  Remove features from CLUZ tables
-  Recalculate target table data
-  Troubleshoot all CLUZ files
-  Display distributions of conservation features



written by
Bob Smith



funded by



Select conservation features to display

- 18 - Terminalia_woodland
- 19 - Woodland_on_red_sands
- 21 - Sand_forest
- 30 - Subsistence_agriculture
- 31 - Commercial_agriculture
- 33 - Open_water
- 105 - F_splendens
- 107 - A_gigantica
- 156 - Vulture_nest

Choose legend categories

Equal interval

Equal area

Name of shapefile that will be produced:

C:\marxan\cluz_dist1.shp

Browse

OK

Cancel

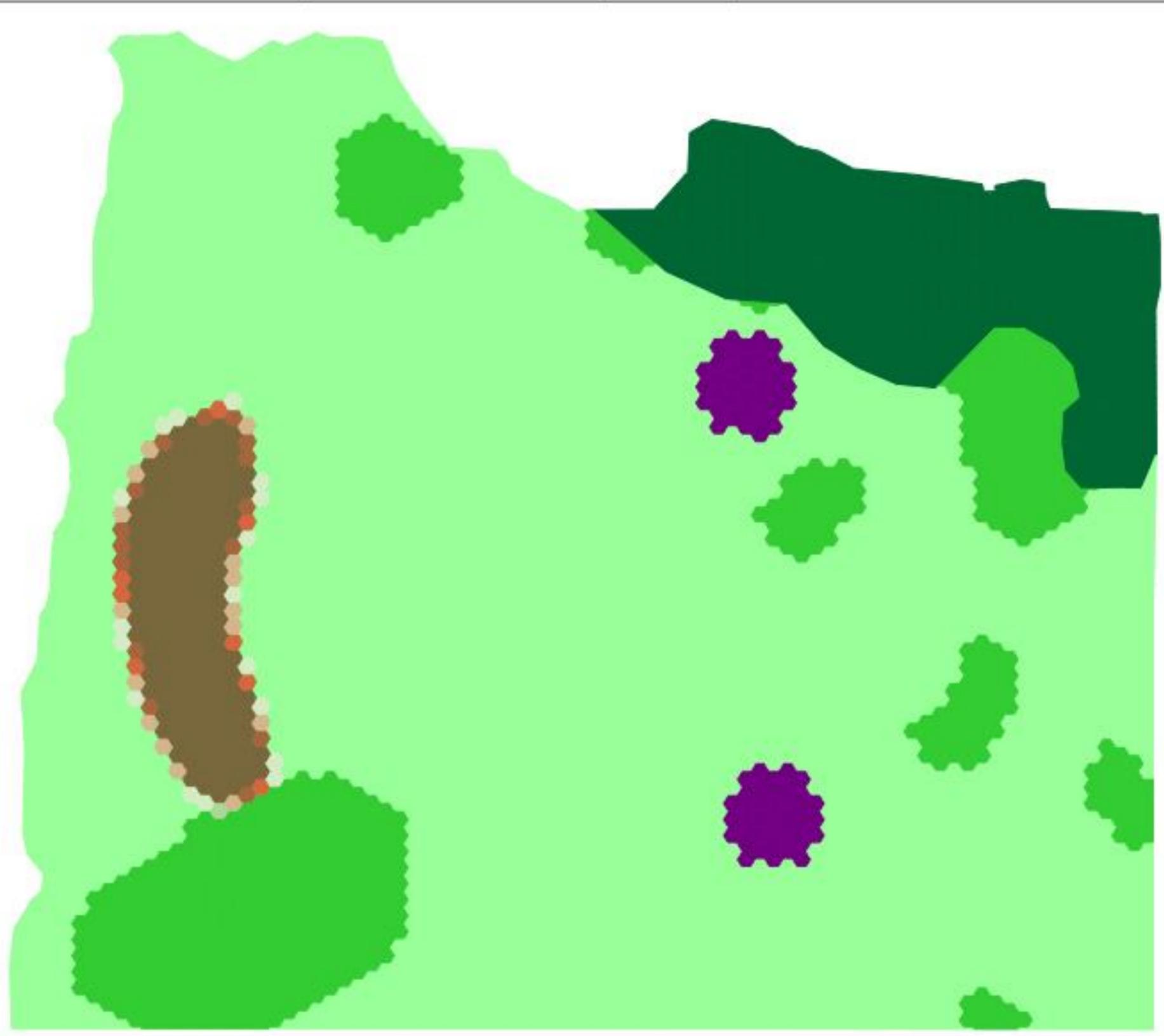
Camadas

A gigantesca

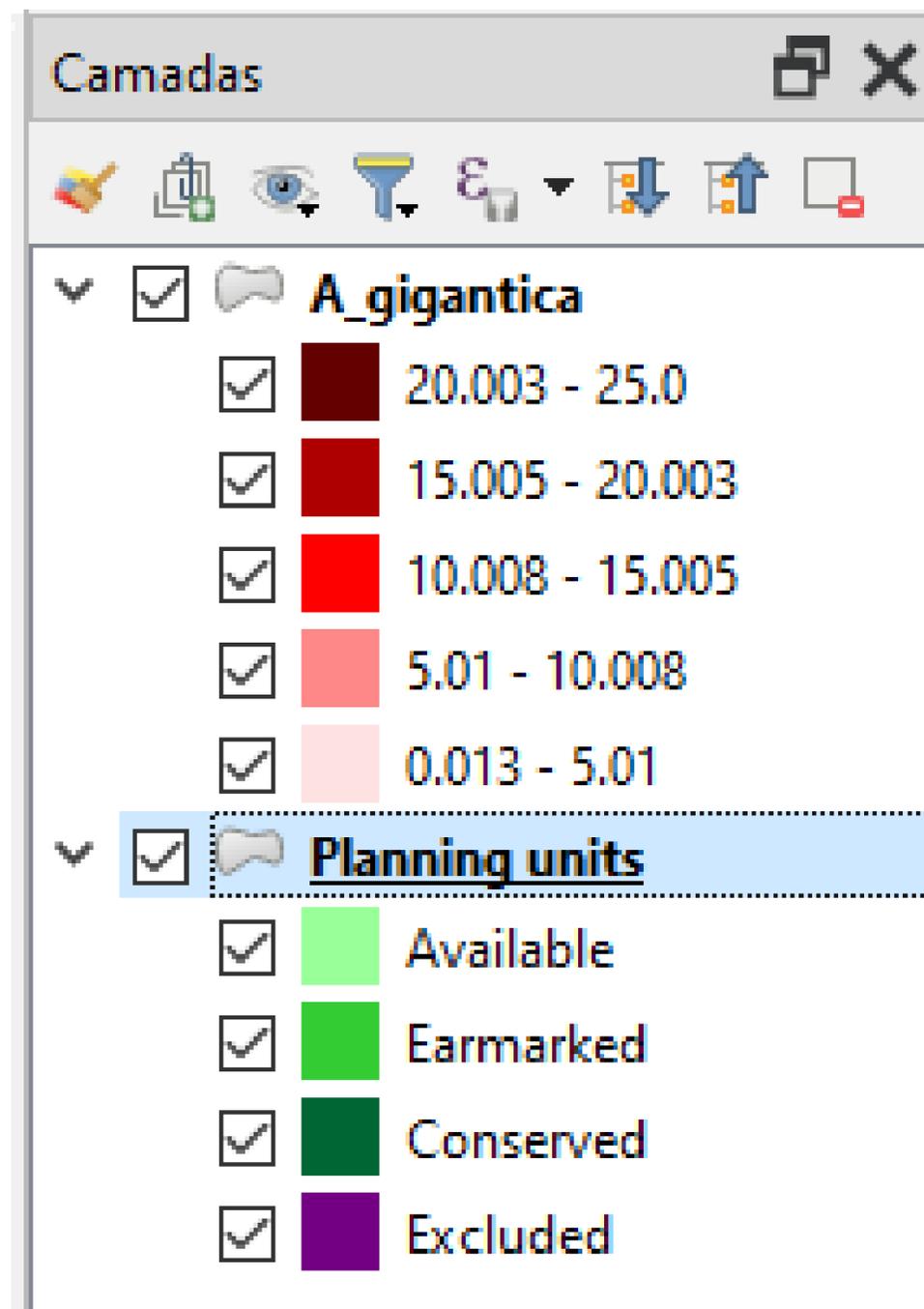
- 20.003 - 25.0
- 15.005 - 20.003
- 10.008 - 15.005
- 5.01 - 10.008
- 0.013 - 5.01

Planning units

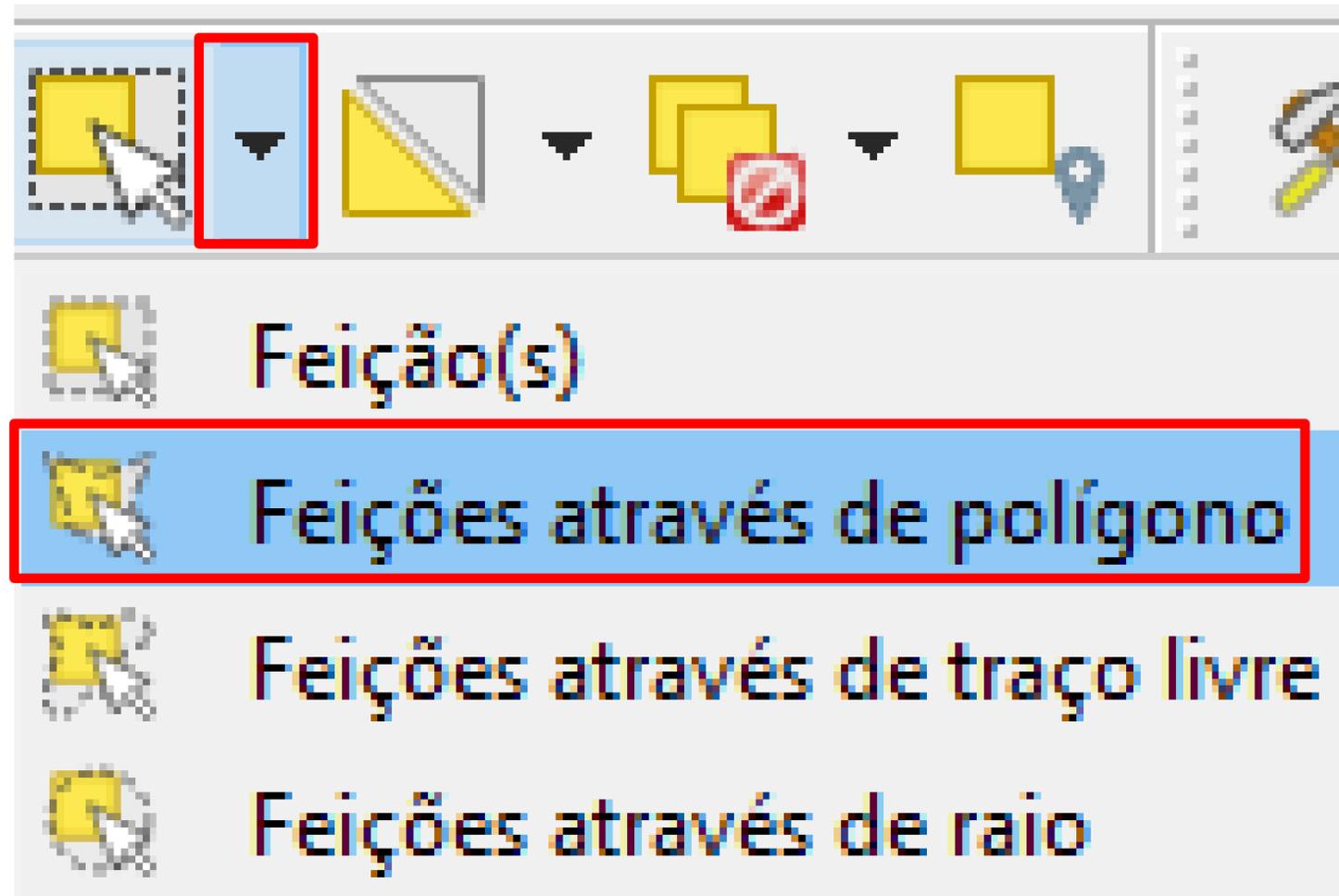
- Available
- Earmarked
- Conserved
- Excluded



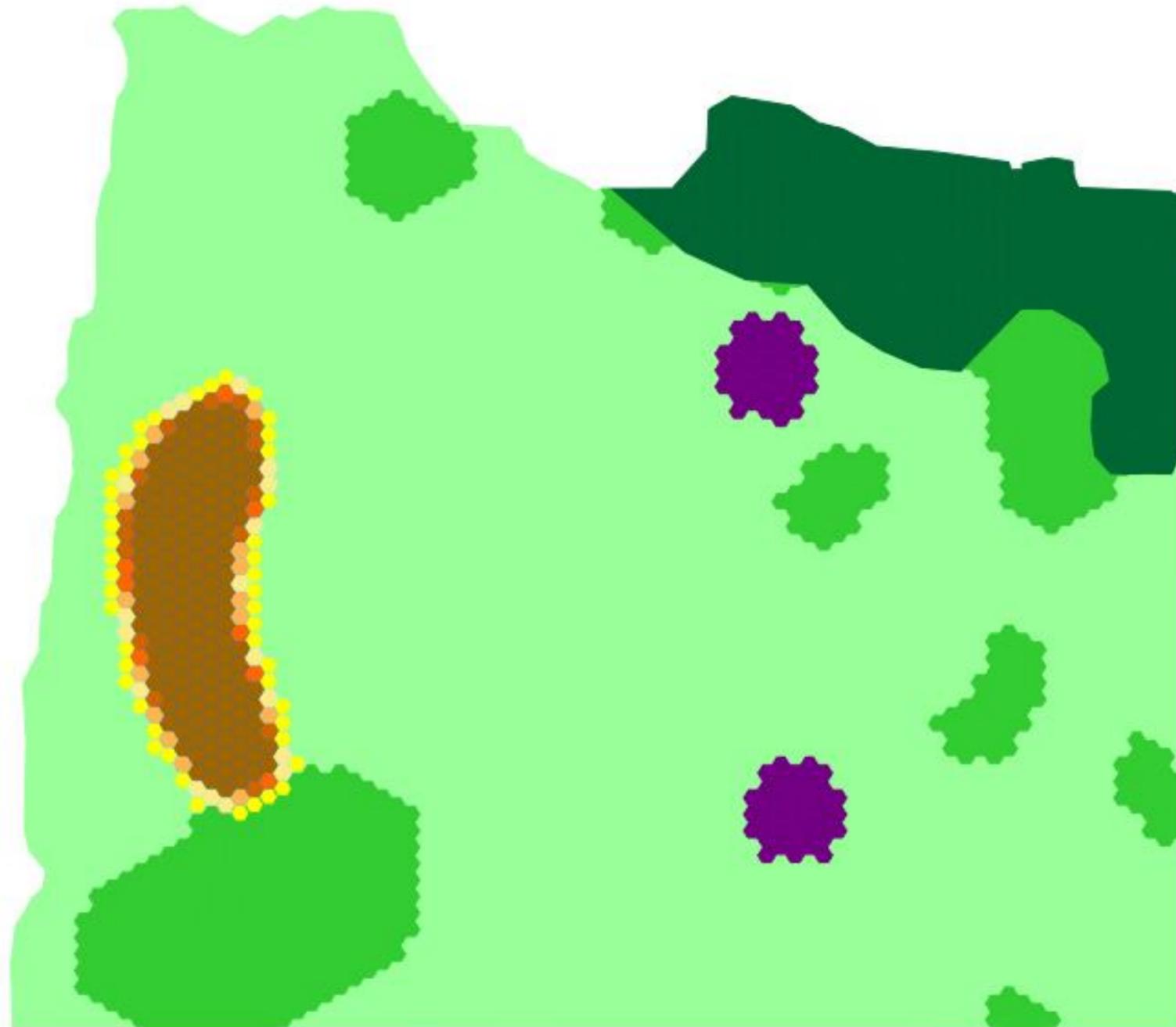
- Clique novamente na camada “Planning Units” para torná-la ativa



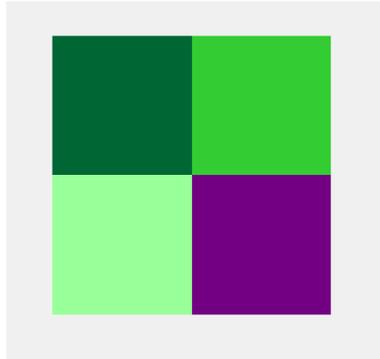
- Na barra de ferramentas de seleção, escolha a opção “Feições através de polígono”



- Digitalize um polígono estendendo a área proposta de conservação a sudoeste (canto inferior esquerdo) para abranger a área de ocorrência de “A. gigantea”
- Clique com o botão direito do mouse para fechar o polígono



- Clique novamente no botão “Change unit and status”



- Escolha a opção “Set as Earmarked”
- Observe a mudança nas metas (targets) atingidos

58

Change Status panel

Set as Available

Set as Earmarked

Allow changes to Conserved and Excluded status

Set as Conserved

Set as Excluded

Targets met: 5 of 19

Change Undo

Camadas

A_gigantica

- 20.003 - 25.0
- 15.005 - 20.003
- 10.008 - 15.005
- 5.01 - 10.008
- 0.013 - 5.01

Planning units

- Available
- Earmarked
- Conserved
- Excluded

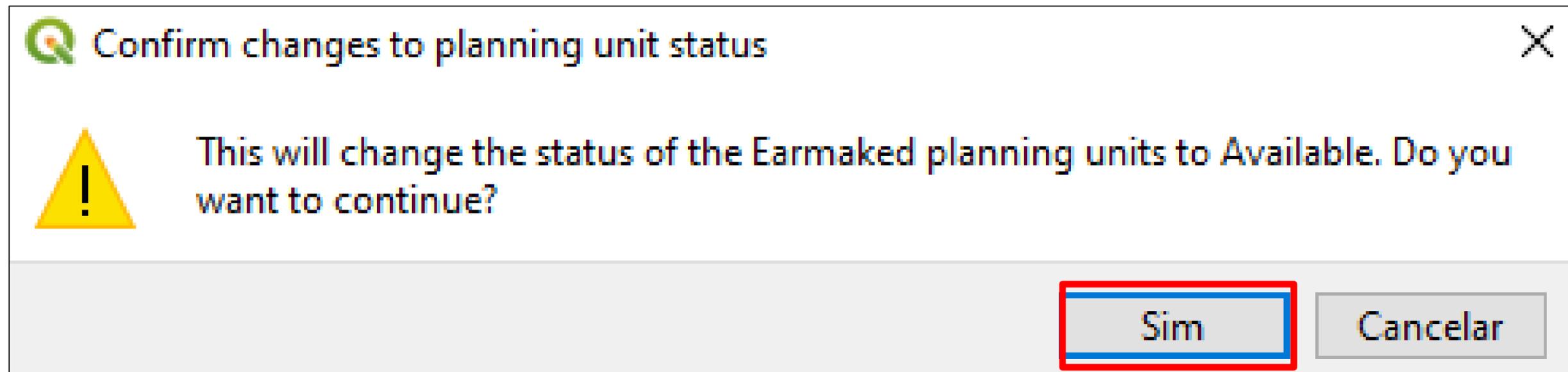


Partes

1. Análise manual

2. Análise sistemática

- Clique no botão “Change Earmarked units to Available”

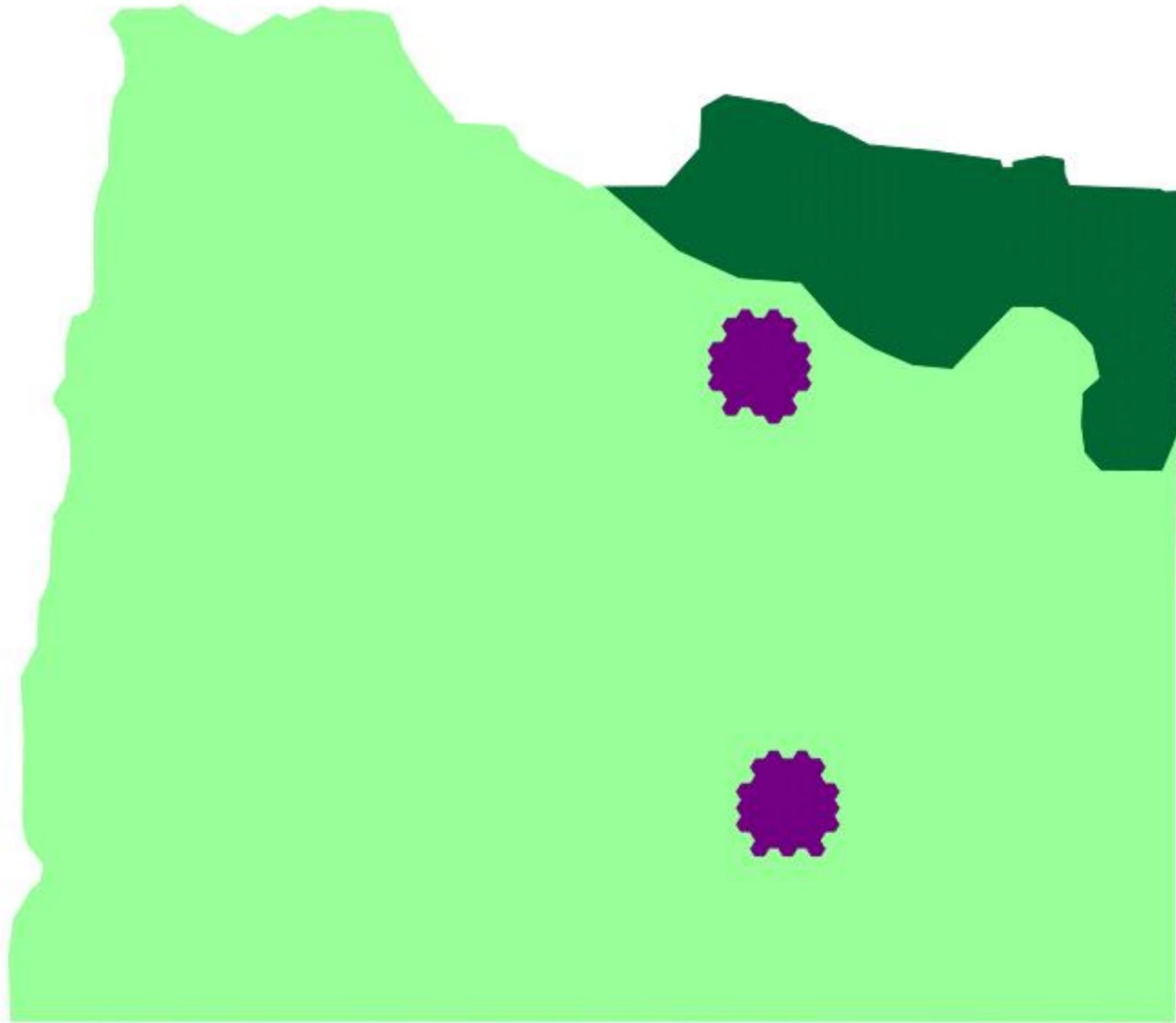


Camadas

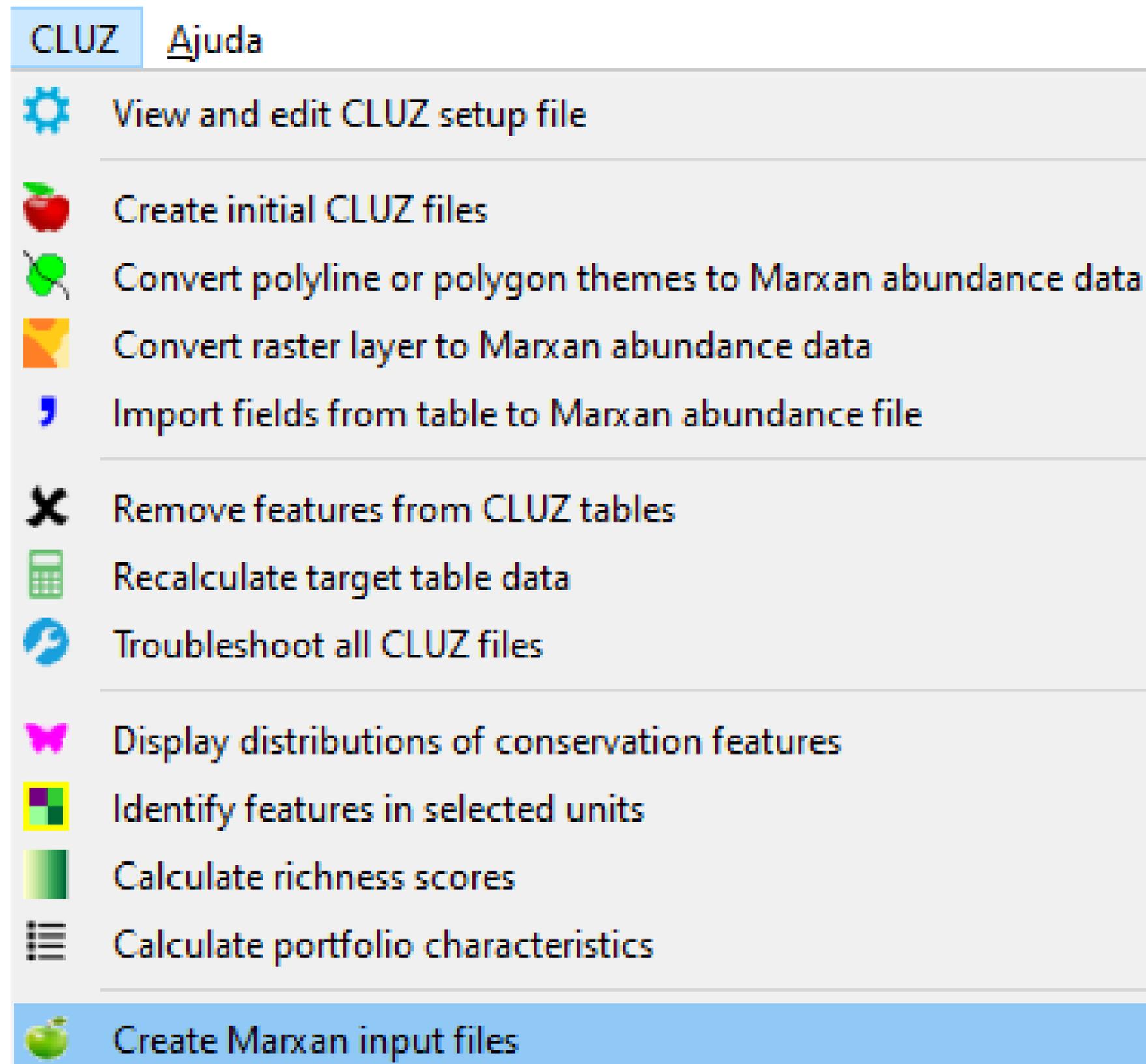
A_gigantica

Planning units

- Available
- Earmarked
- Conserved
- Excluded



- Menu “Create Marxan input files”



- Marque as três primeiras opções e clique em OK

input

Name

 bound.dat

 pu.dat

 puvspr2.dat

 spec.dat

 sporder.dat

Create the following Marxan files from the CLUZ files:

Target file (spec.dat)

Planning unit file (pu.dat)

Boundary file (bound.dat)

Include planning region boundaries

OK

Cancel

Metas

```
spec.dat - Notepad
File Edit Format View Help
id,name,target,spf,type
1,Montane_aquatic,244.2625,10.0,1
2,Rock_faces,158.025,10.0,1
3,Montane_grassland,136.025,10.0,2
4,Montane_woodland,4919.6125,10.0,1
5,Montane_thicket,2055.7875,10.0,1
```

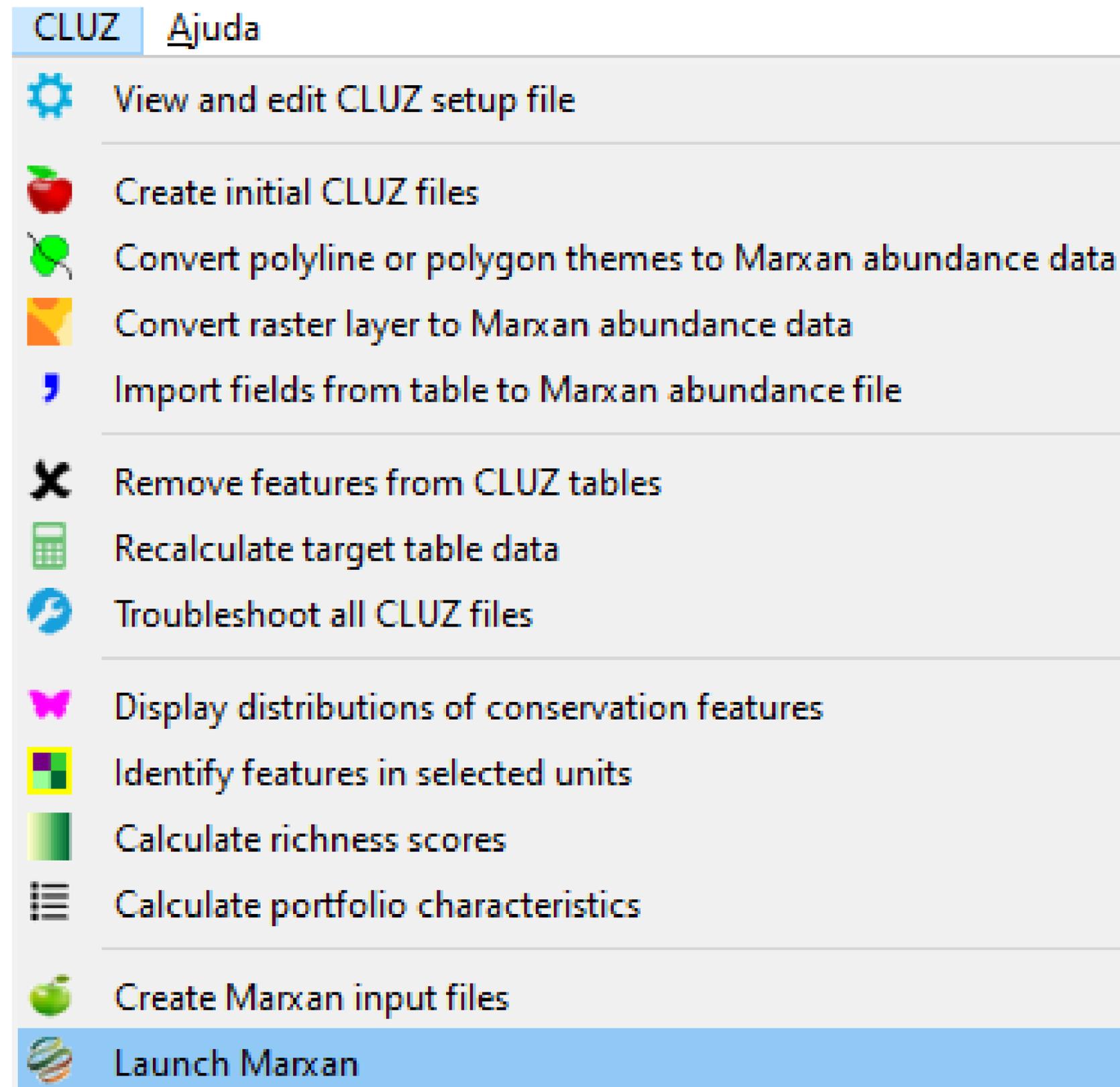
Unidades de Planejamento

```
pu.dat - Notepad
File Edit Format View Help
id,cost,status,xloc,yloc
1,7.04,2,434283.679,7019734.470
2,11.67,2,435128.193,7019714.469
3,11.53,2,436055.429,7019715.649
4,1.35,2,433911.453,7020028.358
5,24.57,2,434662.891,7019860.303
```

Bordas entre unidades de planejamento

```
bound.dat - Notepad
File Edit Format View
id1,id2,boundary
1,4,5.490
1,5,294.593
1,8,310.202
1,3343,571.749
2,5,294.593
2,6,294.593
2,9,310.202
2,3344,604.795
3,6,294.593
```

- Menu “Launch Marxan”



Standard options

Advanced options

Number of iterations

1000000

Number of runs

10

Output file name

output2

Include boundary cost (BLM)

Produce extra Marxan outputs

Start Marxan

Close

Camadas

- Best (output1)**
 - Selected
- SF_Score (output1)*
- A_gigantica*
- Planning units**



Camadas

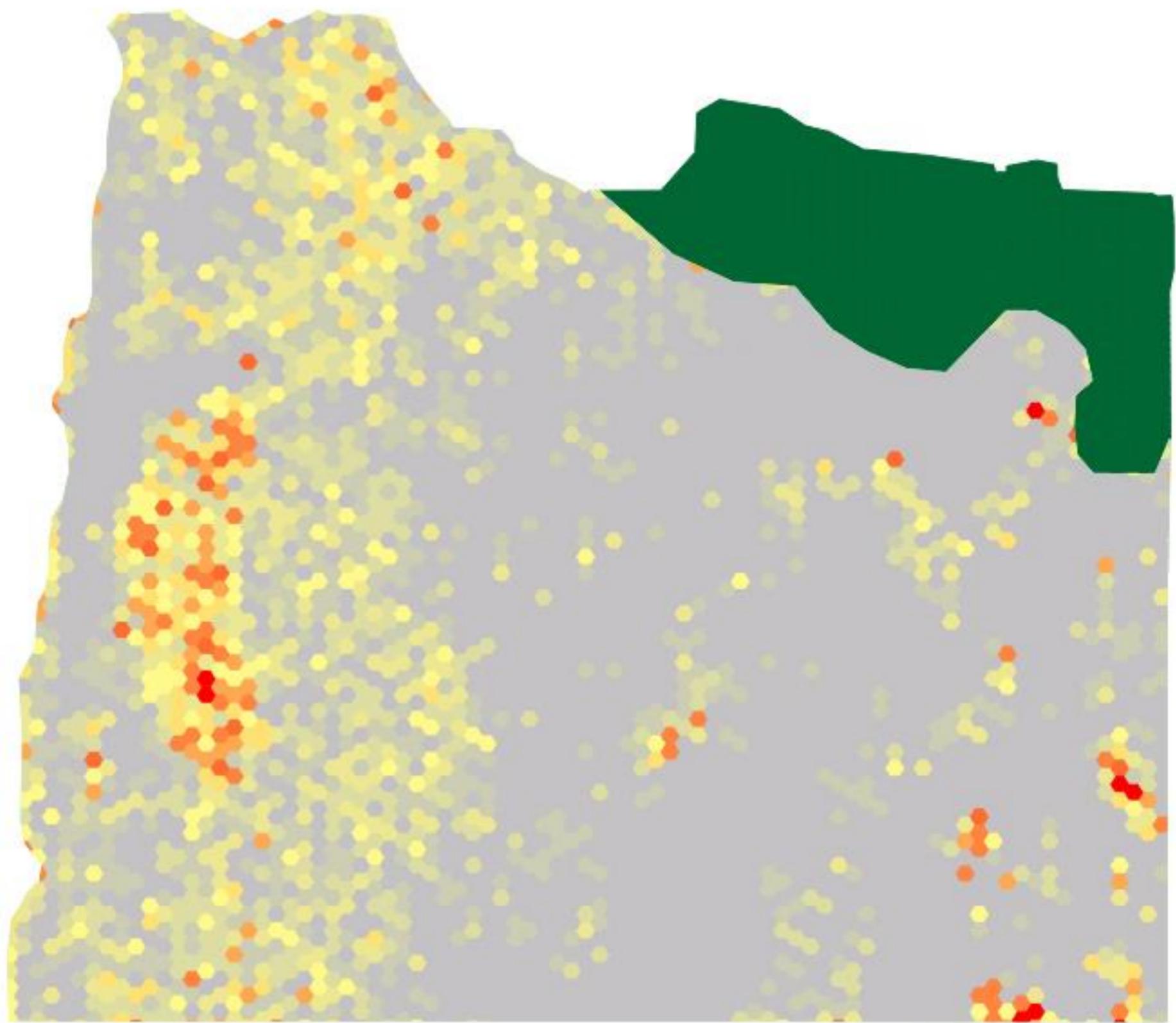
Best (output1)

SF Score (output1)

- 9.0 - 10.0
- 8.0 - 9.0
- 7.0 - 8.0
- 6.0 - 7.0
- 5.0 - 6.0
- 4.0 - 5.0
- 3.0 - 4.0
- 2.0 - 3.0
- 1.0 - 2.0
- 0 - 1.0

A_gigantica

Planning units

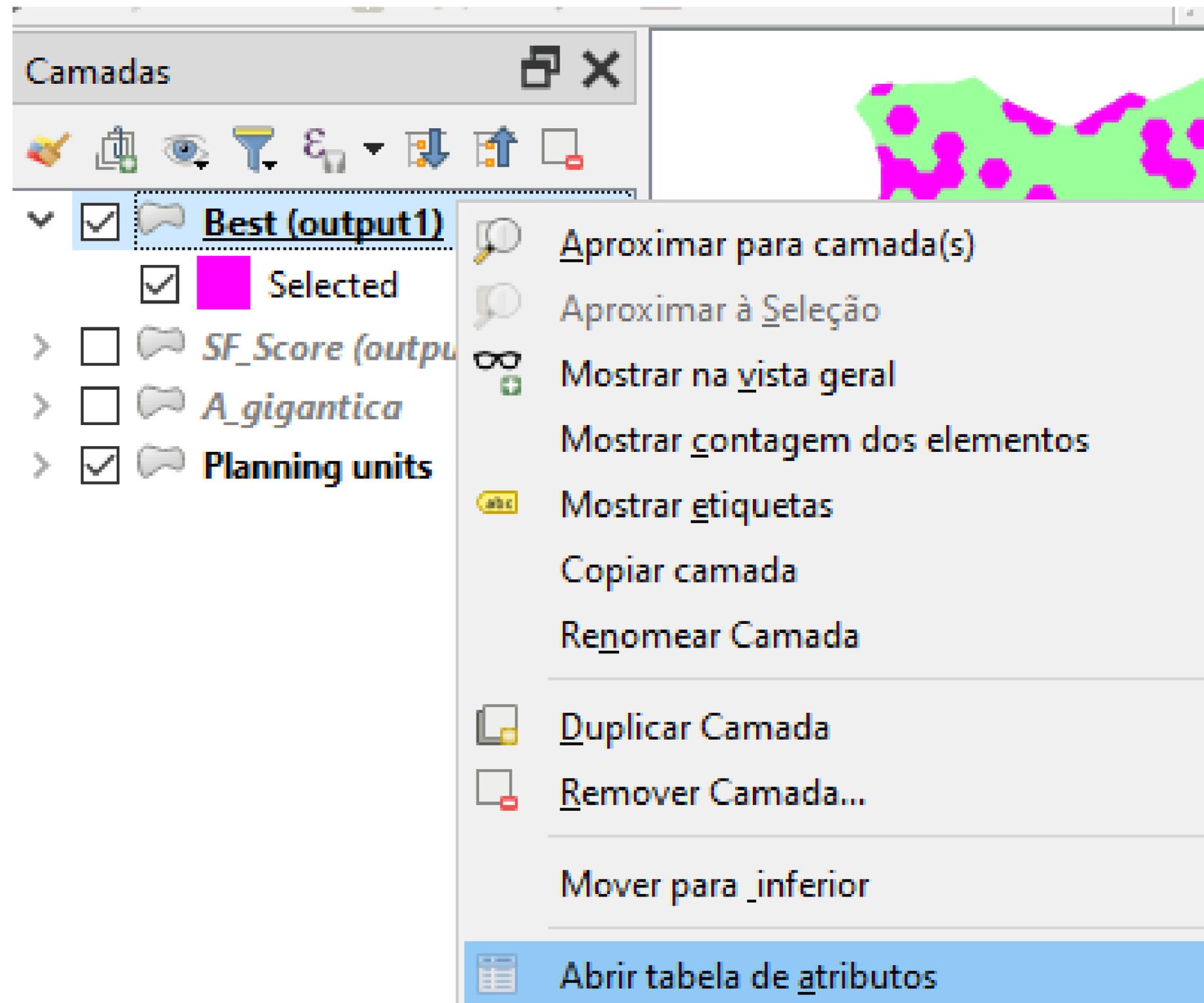


- Clique no botão “Open Marxan results table”



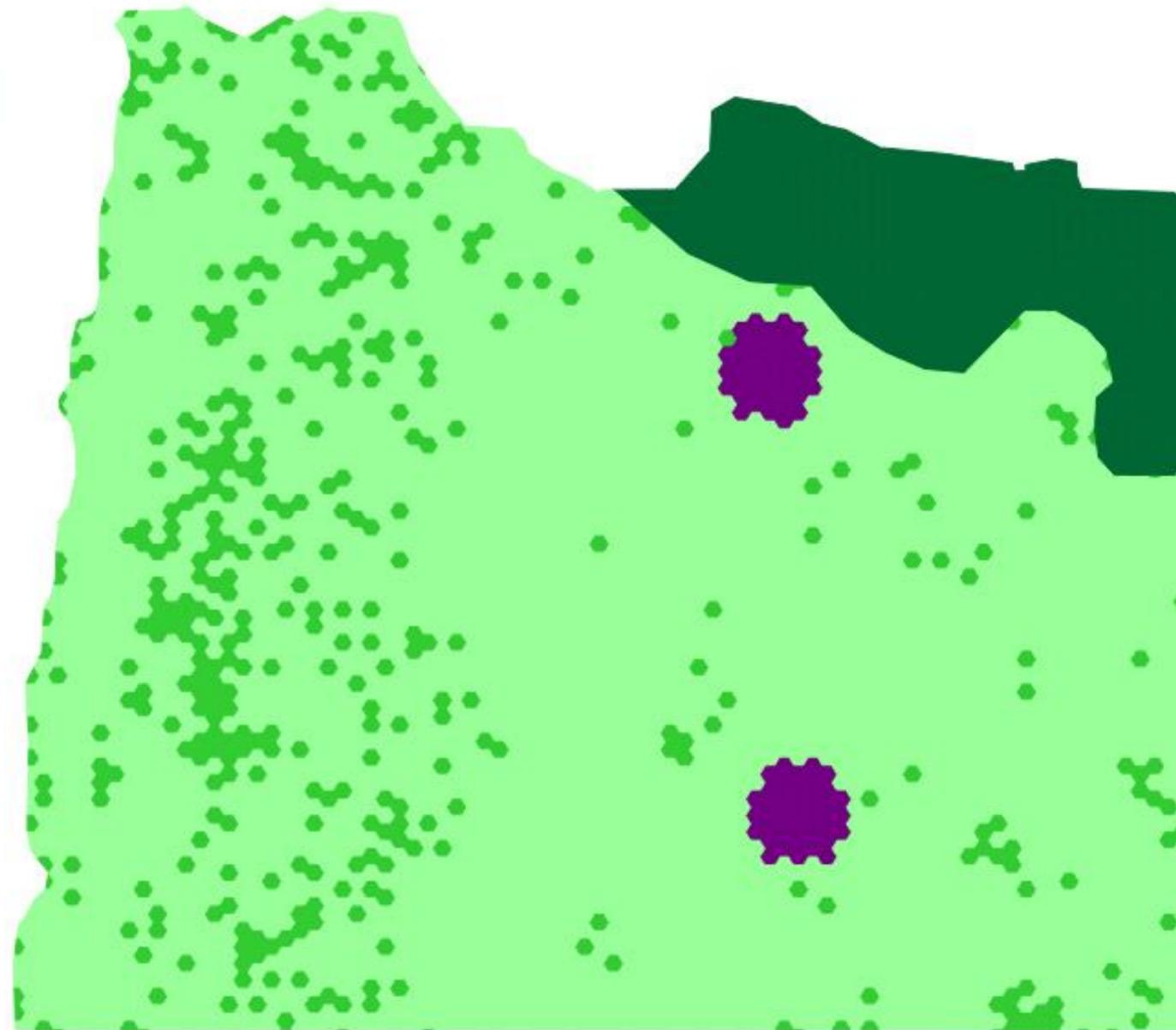
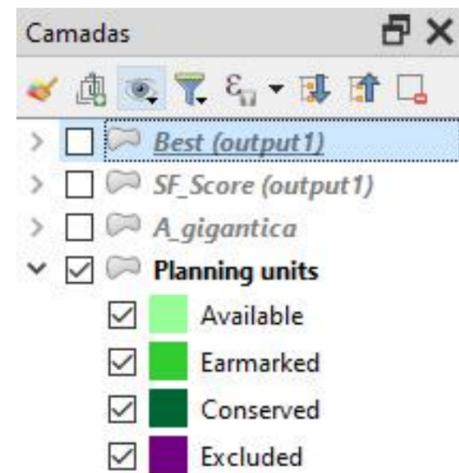
Conservation Feature	Feature Name	Target	Amount Held	Occurrence Target	Occurrences Held	Separation Target	Separation Achieved	Target Met	MPM
1	Montane_aquatic	244.262500	244.240000	0	100	0	3306597	no	0.999908
2	Rock_faces	158.025000	158.878000	0	160	0	3306597	yes	1.000000
3	Montane_grassland	136.025000	137.568000	0	41	0	3306597	yes	1.000000
4	Montane_woodland	4919.612500	4919.822000	0	348	0	3306597	yes	1.000000
5	Montane_thicket	2055.787500	2056.051000	0	286	0	3306597	yes	1.000000
6	Montane_forest	70.025000	70.063000	0	11	0	3306597	yes	1.000000
8	Acacia_woodland	1356.162500	1356.806000	0	194	0	3306597	yes	1.000000
9	Acacia_thicket	2020.125000	2923.121000	0	223	0	3306597	yes	1.000000
11	Floodplain_grassland	1752.950000	1754.565000	0	245	0	3306597	yes	1.000000
12	Reed_beds	655.700000	970.621000	0	237	0	3306597	yes	1.000000
13	Riverine_thicket	589.375000	589.628000	0	163	0	3306597	yes	1.000000
14	Riverine_forest	442.700000	856.055000	0	192	0	3306597	yes	1.000000
18	Terminalia_woodland	1957.350000	1957.373000	0	187	0	3306597	yes	1.000000
19	Woodland_on_red_sands	345.600000	415.186000	0	30	0	3306597	yes	1.000000
21	Sand_forest	388.075000	388.999000	0	43	0	3306597	yes	1.000000
30	Subsistence_agriculture	0.000000	1603.690000	0	355	0	3306597	yes	1.000000
31	Commercial_agriculture	0.000000	4.626000	0	2	0	3306597	yes	1.000000
33	Open_water	356.675000	604.562000	0	170	0	3306597	yes	1.000000
105	F_splendens	2000.000000	2073.181000	0	96	0	3306597	yes	1.000000
107	A_gigantica	2000.000000	2001.181000	0	87	0	3306597	yes	1.000000
156	Vulture_nest	20.000000	21.000000	0	18	0	3306597	yes	1.000000

- Selecione a camada “Best”, clique com o botão direito do mouse e selecione “Abrir tabela de atributos”

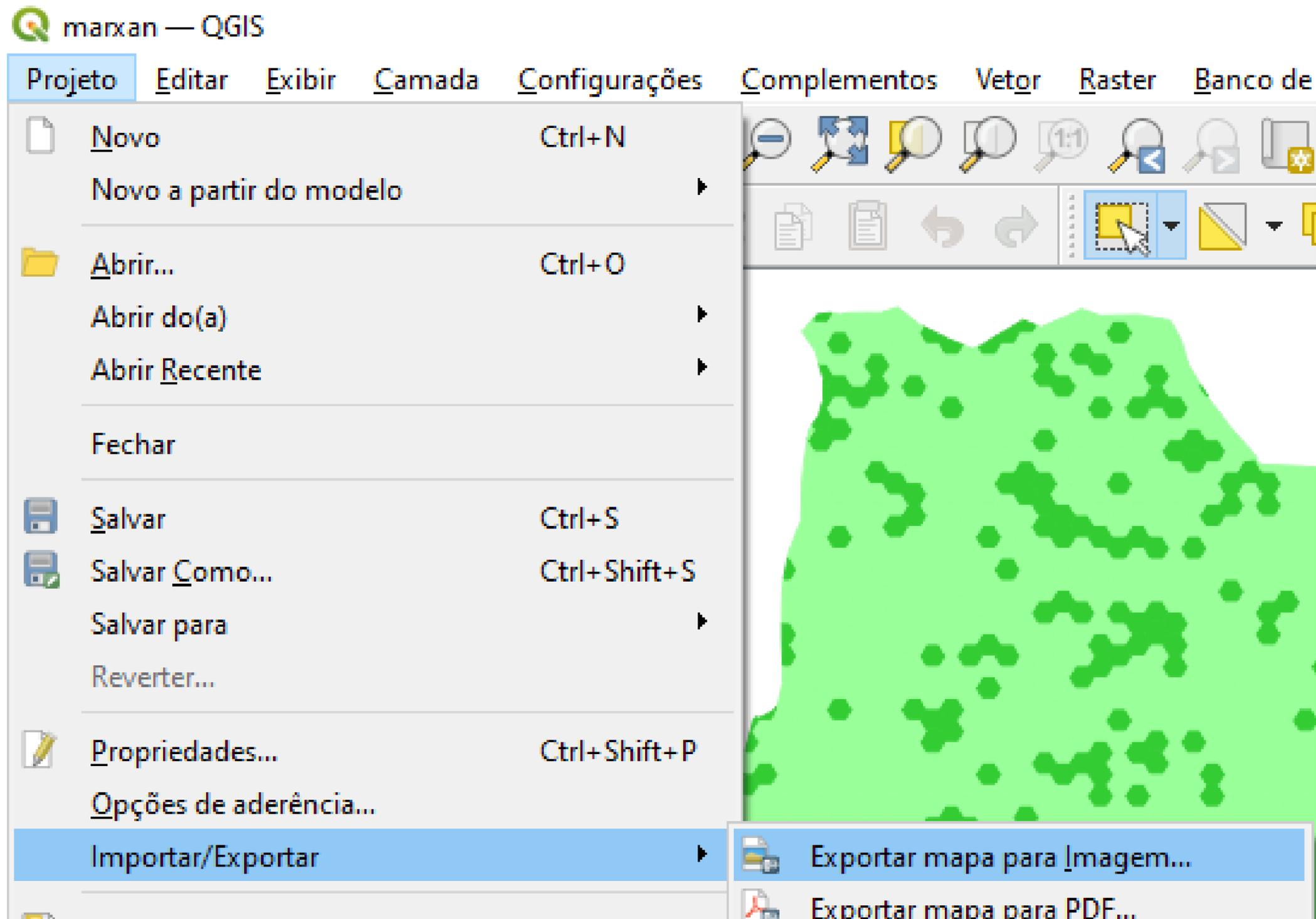


	Unit_ID	Area	Cost	Status	Previous	Best	SF_Score
1	1747	25,00	25,00	Available	1	Selected	10
2	3644	25,00	25,00	Available	1	Selected	10
3	538	3,66	3,66	Available	0	-	9
4	576	17,81	17,81	Available	1	Selected	9
5	618	25,00	25,00	Available	1	Selected	9
6	1788	25,00	25,00	Available	1	Selected	9
7	2212	25,00	25,00	Available	0	Selected	9
8	2295	25,00	25,00	Available	0	Selected	9
9	503	2,86	2,86	Available	0	Selected	8
10	528	2,97	2,97	Available	0	-	8
11	1617	25,00	25,00	Available	0	Selected	8

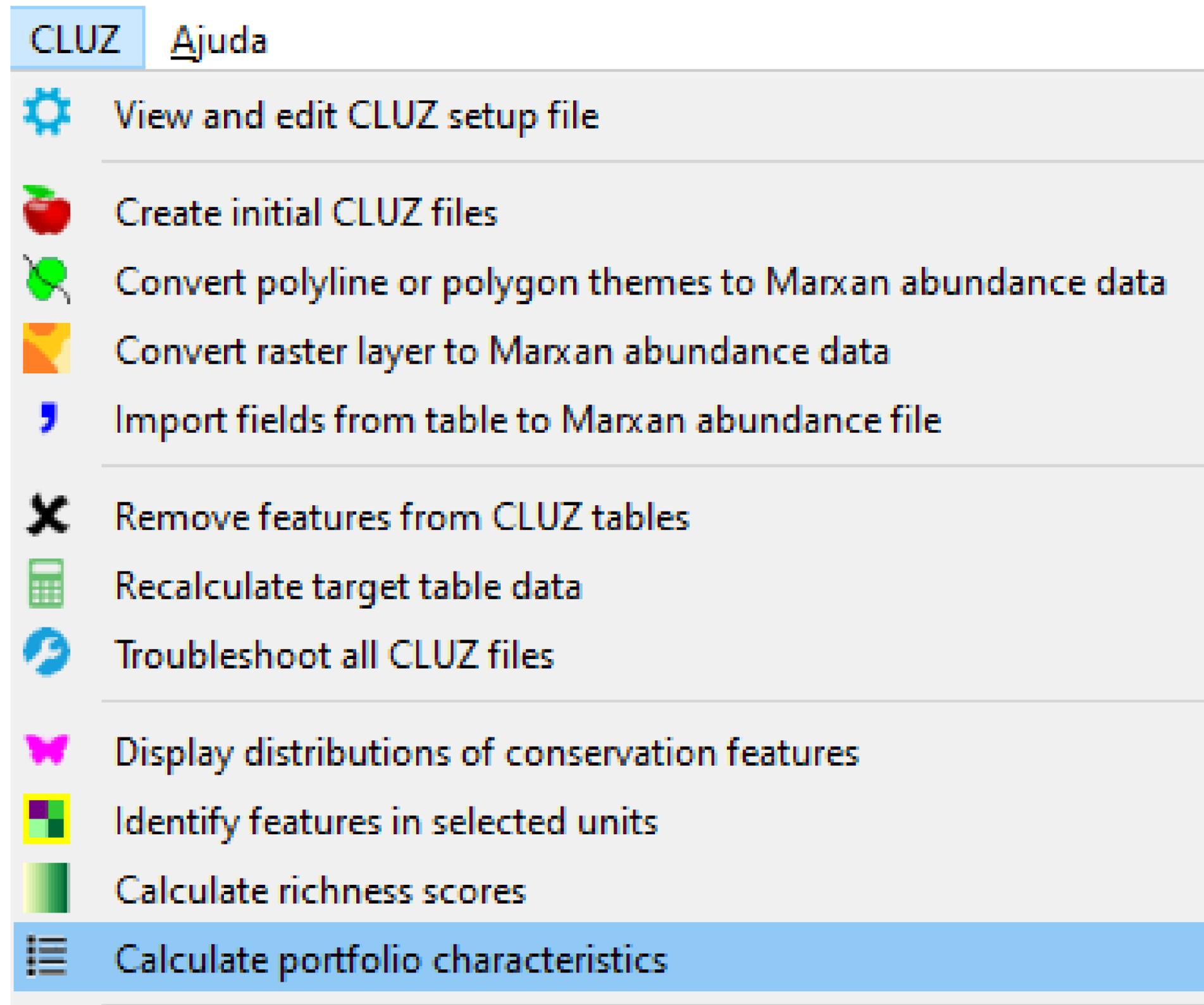
- Selecione o botão
“Change the status of the Best units to Earmarked”



- Menu “Projeto” -> “Importar/exportar” -> “Exportar mapa para Imagem”
- Grave como “area_0.png” na pasta da atividade



- Menu “Calculate portfolio characteristics”



Calculate the following details about the current portfolio of planning units:

Planning unit details

Spatial details (patch sizes and boundary length)

Selection frequency details of Available and Earmarked planning units

Field containing values

SF_Score

Number of runs used in analysis (ie
maximum potential selection frequency)

10

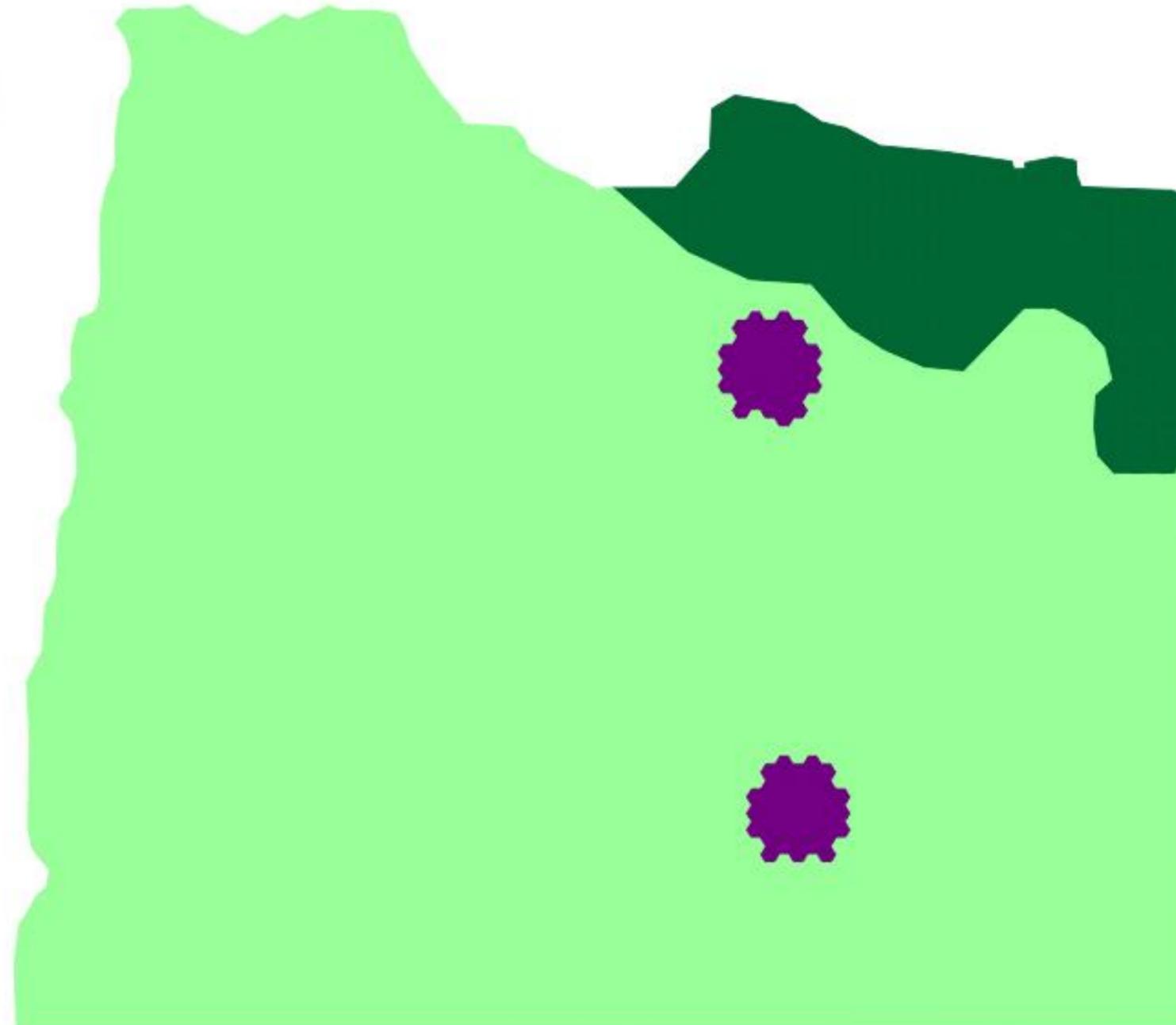
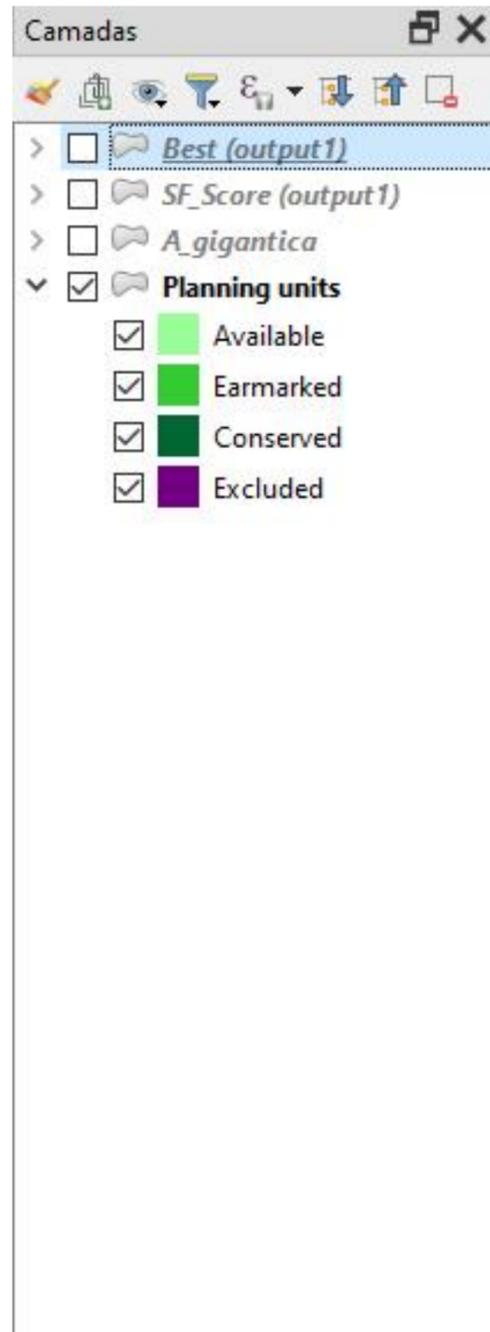
Number of patches containing each conservation feature

OK

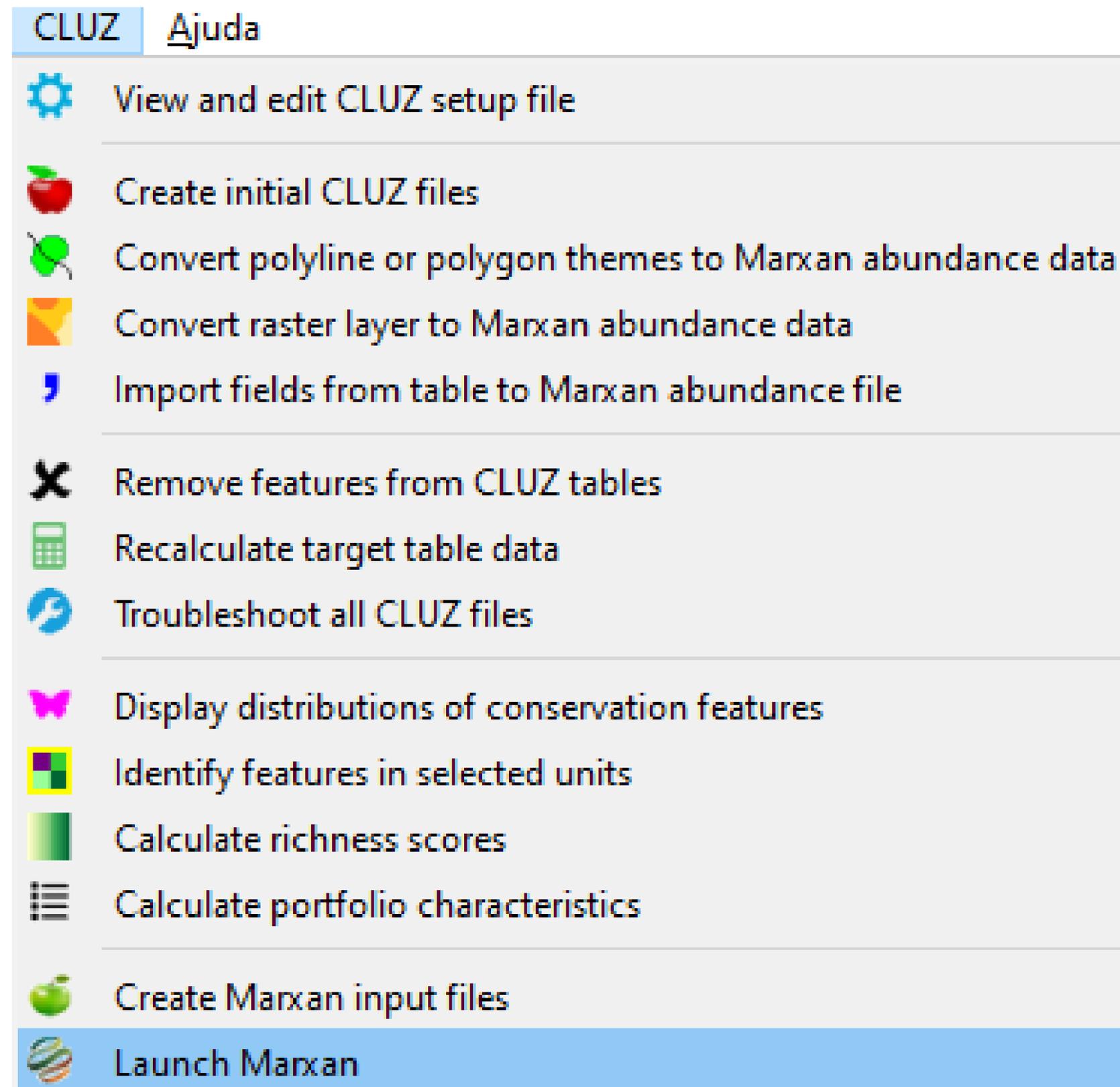
Cancel

Status results		Spatial results	Selection frequency results
Status	Total cost	Total area	No. of planning units
Available	87676.880	87676.880	3630
Conserved	10862.570	10862.570	498
Earmarked	10143.030	10143.030	460
Excluded	1825.000	1825.000	73
Portfolio	21005.600	21005.600	958
Region	110507.480	110507.480	4661

- Clique no botão “Change Earmarked units to Available”



- Menu “Launch Marxan”



Standard options

Advanced options

Number of iterations

1000000

Number of runs

10

Output file name

output2

Include boundary cost (BLM)

0.5

Produce extra Marxan outputs

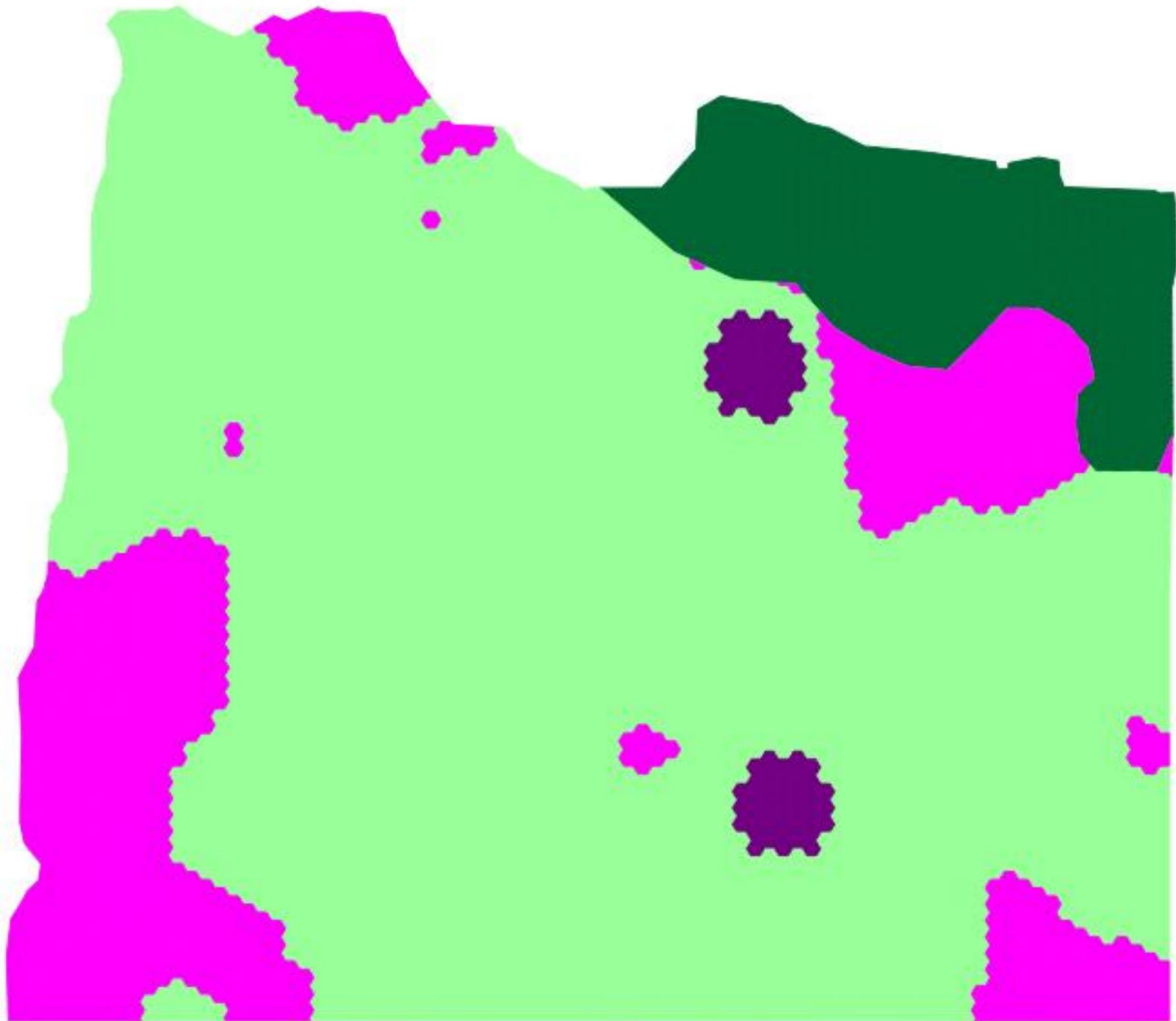
Start Marxan

Close

Camadas

 **Best (output2)**

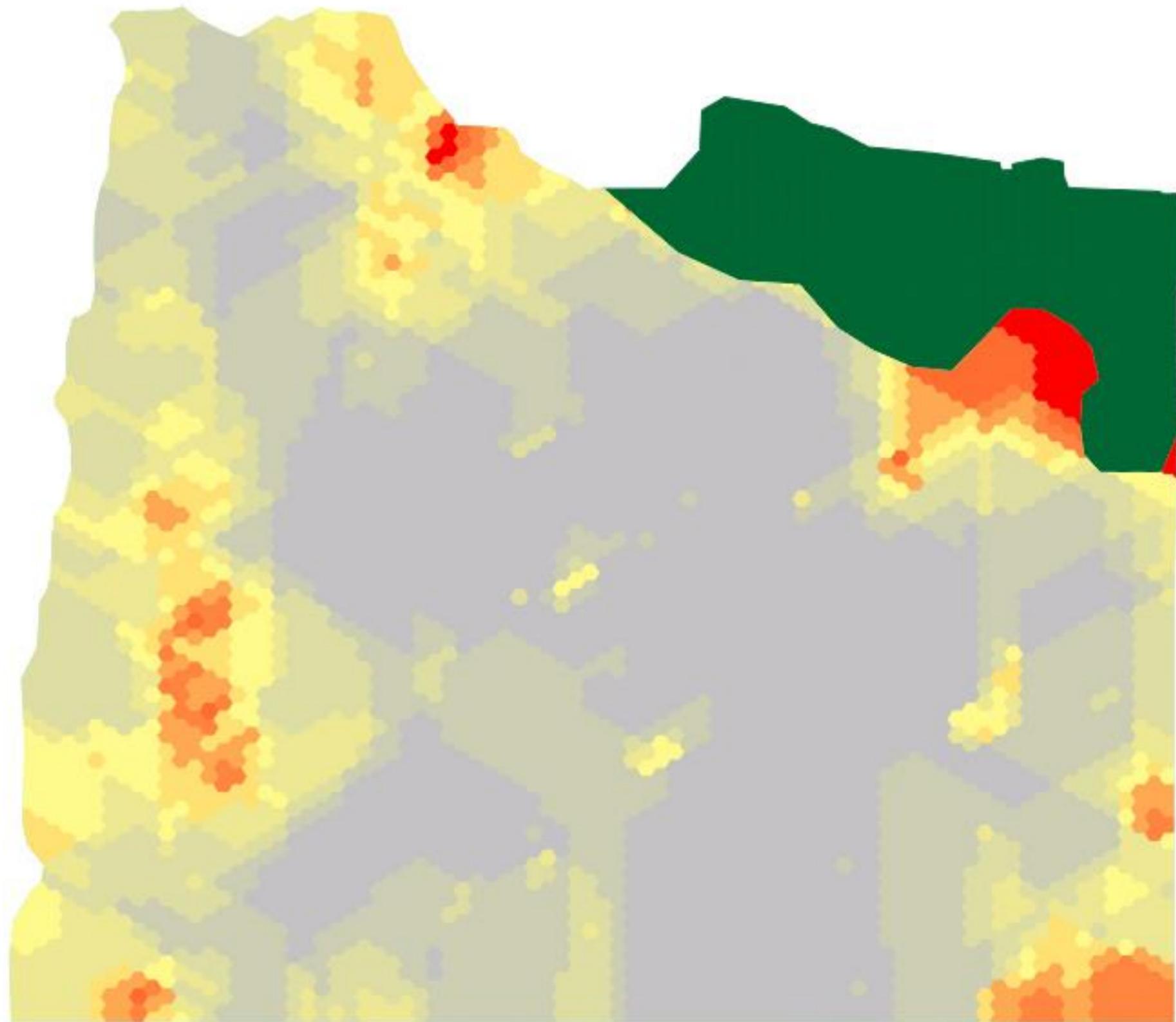
-  Selected
-  *SF Score (output2)*
-  **Planning units**
-  *A_gigantica*



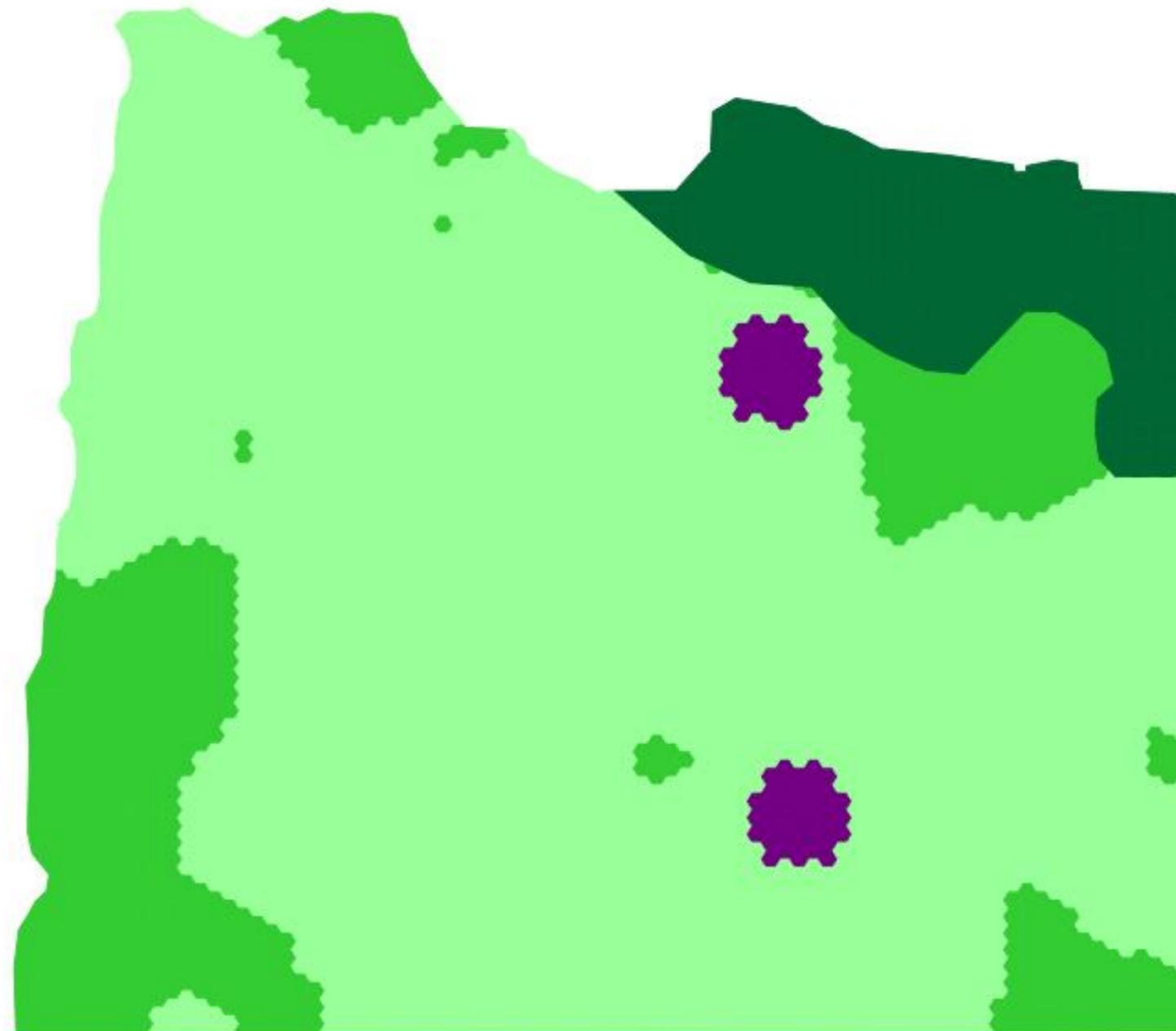
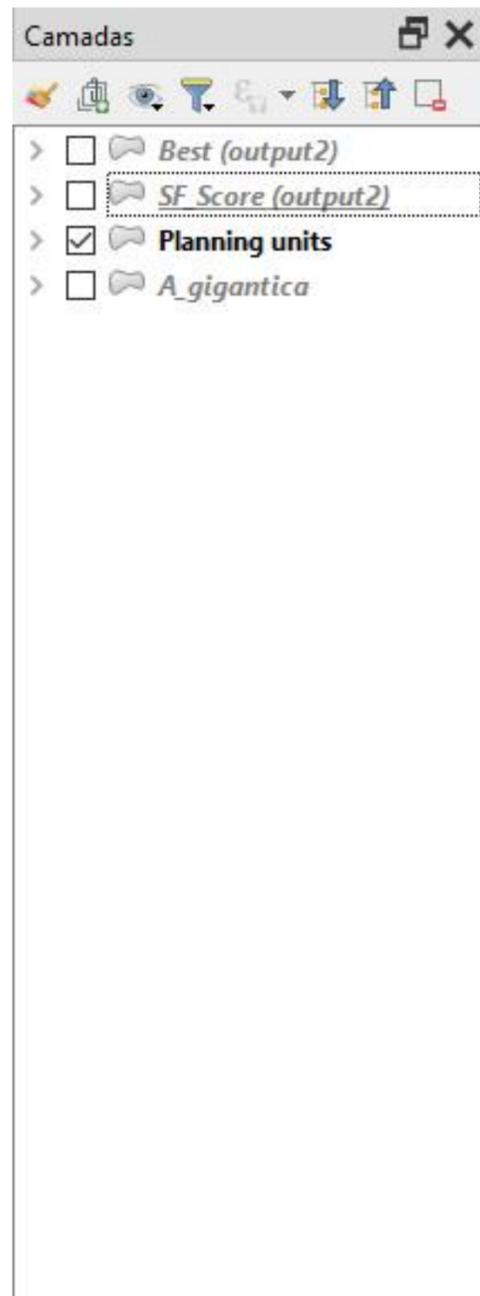
The map displays a geographical area with several distinct regions. A large central area is colored light green. Several irregularly shaped regions are colored magenta, representing 'Selected' areas. Two circular regions with a dark purple, gear-like pattern are also visible, representing 'Planning units'. A large, dark green region is located in the upper right quadrant. The map is overlaid with a grid.

Camadas

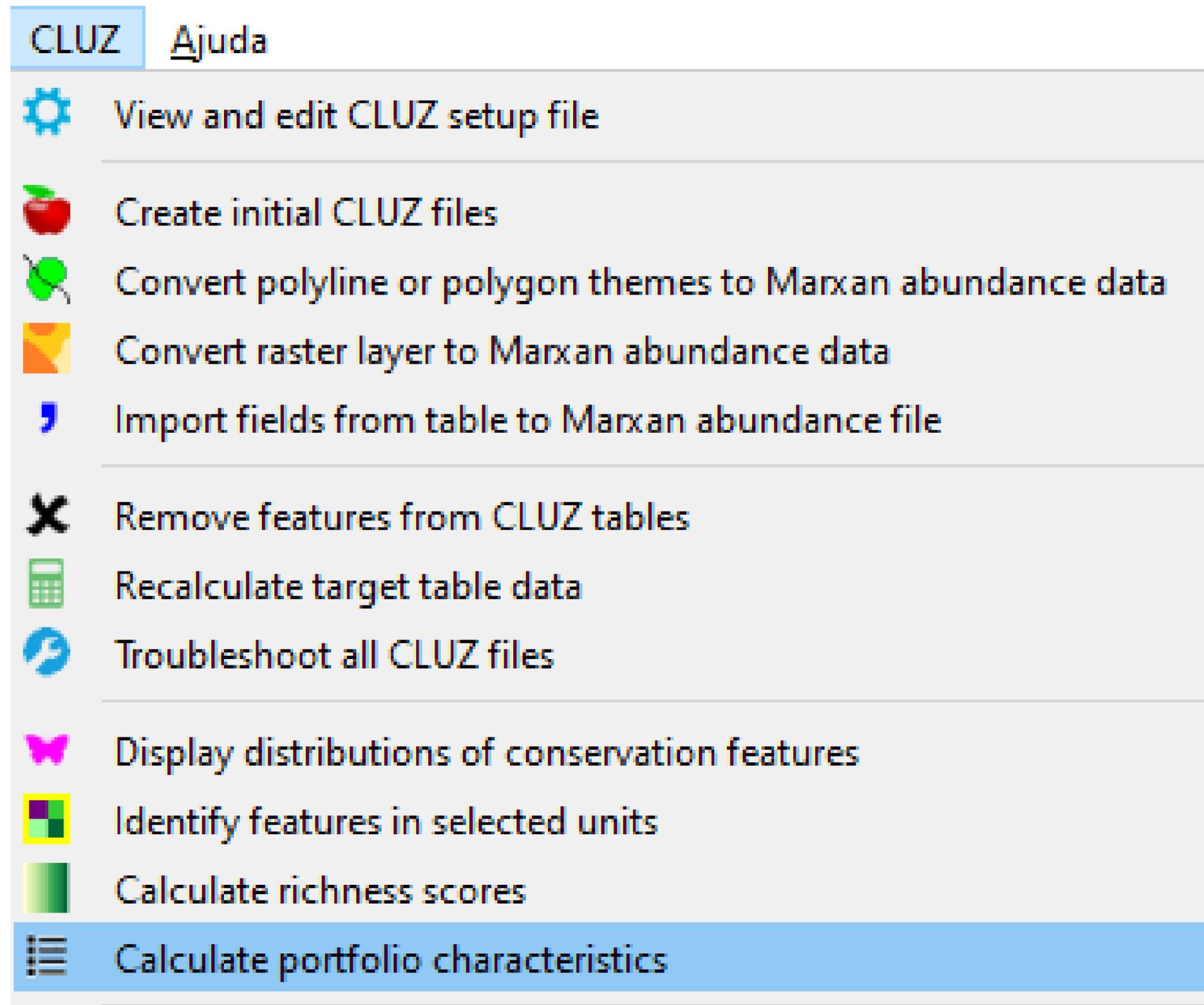
- > Best (output2)
- ▼ **SF Score (output2)**
 - 9.0 - 10.0
 - 8.0 - 9.0
 - 7.0 - 8.0
 - 6.0 - 7.0
 - 5.0 - 6.0
 - 4.0 - 5.0
 - 3.0 - 4.0
 - 2.0 - 3.0
 - 1.0 - 2.0
 - 0 - 1.0
- > **Planning units**
- > *A_gigantica*



- Selecione o botão
“Change the status of the Best units to Earmarked”



- Menu “Calculate portfolio characteristics”



Calculate the following details about the current portfolio of planning units:

Planning unit details

Spatial details (patch sizes and boundary length)

Selection frequency details of Available and Earmarked planning units

Field containing values

SF_Score

Number of runs used in analysis (ie
maximum potential selection frequency)

10

Number of patches containing each conservation feature

OK

Cancel

Comparação entre os resultados

	BLM = 0	BLM = 0.5
Earmarked (area)	10143	18728
Number of patches	214	9
Portfolio boundary length	594904	111896