



GeMBalkans
Generating momentum on water and forest management



Using GIS and modern technology in forestry

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Technical specifications:

- ❖ Weight (incl. supplied camera & battery): 0.7 kg
- ❖ Wingspan: 96 cm
- ❖ Material: EPP (light)
- ❖ Batteries: 11.1 V, 2100 mAh
- ❖ Package: 55 x 45 x 25 cm



Technical specifications:

- ❖ Max flight time (one battery): do 50 minuta
- ❖ Cruise speed: 40-90 km/h (11-25 m/s)
- ❖ Wind resistance: 45 km/h (12 m/s)
- ❖ Landing: Automatic, linear with ~5 m accuracy
- ❖ Min landing area: 20x20m



Camera and orthophoto

- ❖ **Camera: Canon 16MP IXUS**
- ❖ **Area mapped by one flight: up to 50 km² (depending on resolution)**
- ❖ **Min pixel size (GSD): do 1.5 cm**
- ❖ **Accuracy orthophoto: 3–20cm**
- ❖ **Accuracy DEM: up to 5 cm**
- ❖ **Optional infrared, multispectral...**



WARNING | START MISSION | RESUME MISSION | GO TO START WPT | GO TO HOME WPT | GO LAND | HOLD POSITION | LAND NOW Click: 3x | ABORT LANDING

ER-01-008

Start kacki put

RTK source not defined
0 m/ATO
73 m/AMSL
[Battery icon] 0:00
GNSS status: Standalone 3D
Idle

287 x 307 m
8.8 ha / 0.09 km²
154°
45.2892607°N 19.9076623°E
Altitudes ATO



WARNING START MISSION RESUME MISSION GO TO START WPT GO TO HOME WPT GO LAND HOLD POSITION LAND NOW Click 3x ABORT LANDING

ER-01-008

40m+

20m+

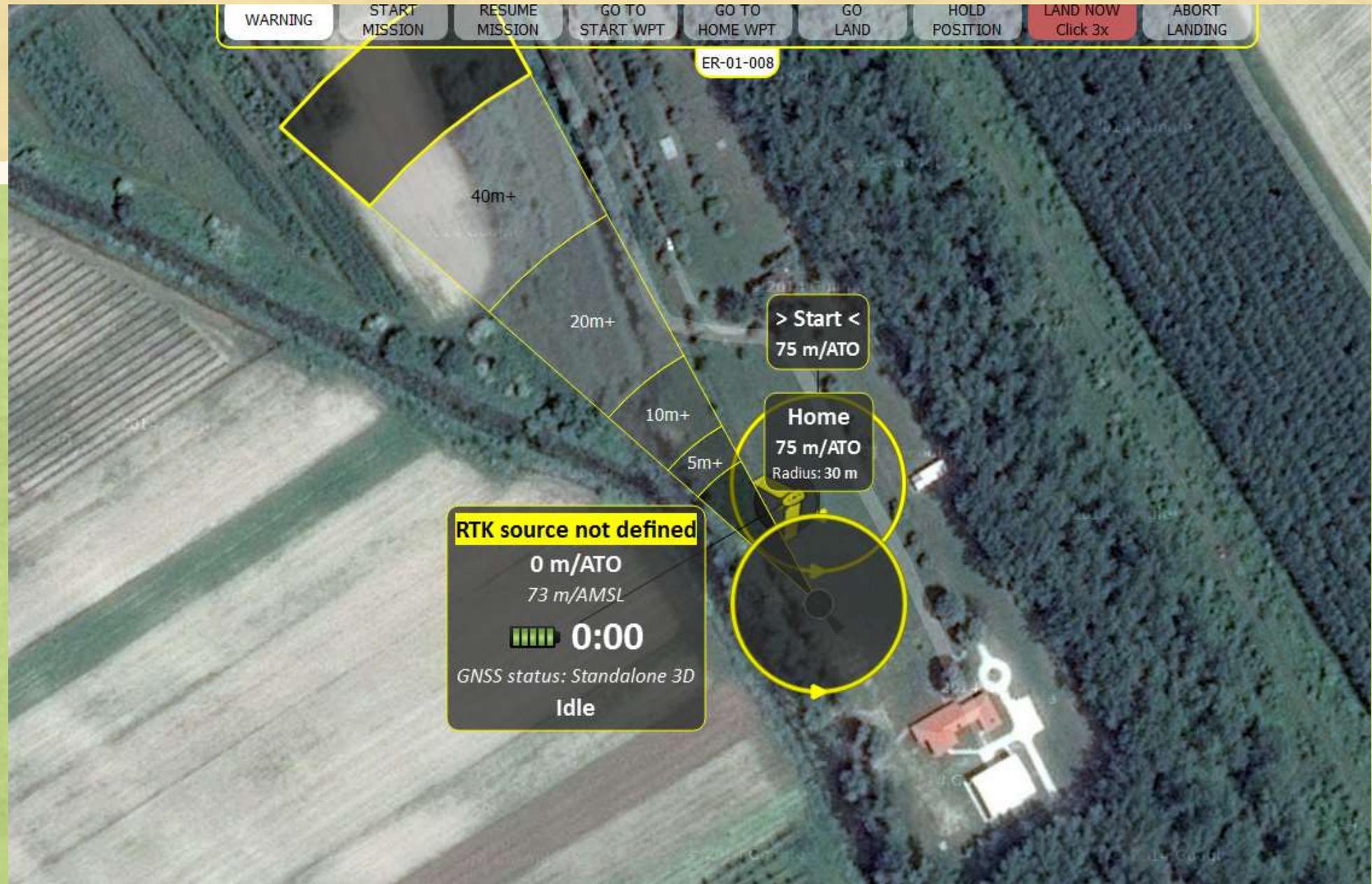
10m+

5m+

> Start <
75 m/ATO

Home
75 m/ATO
Radius: 30 m

RTK source not defined
0 m/ATO
73 m/AMSL
 0:00
GNSS status: Standalone 3D
Idle



eMotion 2

Google Hybrid

ER-01-008

Camera model

WX RGB

Use camera protection kit

Mapping and mission parameters

Difficult terrain Easy terrain

Mission area: Rectangular

Ground resolution: 3,4 cm/px

Camera: WX RGB

Desired altitude: 120.1 m/ATO

Use elevation data to set absolute waypoint altitudes

Lateral overlap: 85%

Longitudinal overlap: 75%

Generate perpendicular flight lines

Reversed flight direction

Save parameters as default for WX RGB

Advanced parameters

Starting waypoint: 1 After previous

Wind estimate: 0° 0,0 m/s

Use current wind estimate

Max flight time: 45 min

Upload

Resulting flight characteristics

Number of flights: 1

not defined

MSL

307 m

0,09 km²

54°

N 19,9068362°E

les ATO

eMotion 2

Google Hybrid

ER-01-008

Flight parameters

Working area radius: 500 m

Working area ceiling: 300 m/ATO

Manual control mode: Full Manual control

Security actions:

- Ignore RC signals
- Return to Home in case of strong wind
- Return to Home in case of poor GPS coverage
- Return to Home in case of low endurance
- Return to Home in case of camera malfunction
- Return to Home after 30s in case of link loss
- Climb in case of detected ground proximity
- Use ground sensor for landing

Preflight checks:

- Disable magnetometer check
- Disable GNSS receiver configuration check

Take-off checks:

- Disable wing check
- Disable eMotion connexion check

General information

Drone

Firmware version: 2.4.9 2951

Bootloader version: n/a

Serial number: ER-01-008

Autopilot serial number: n/a

GNSS Board

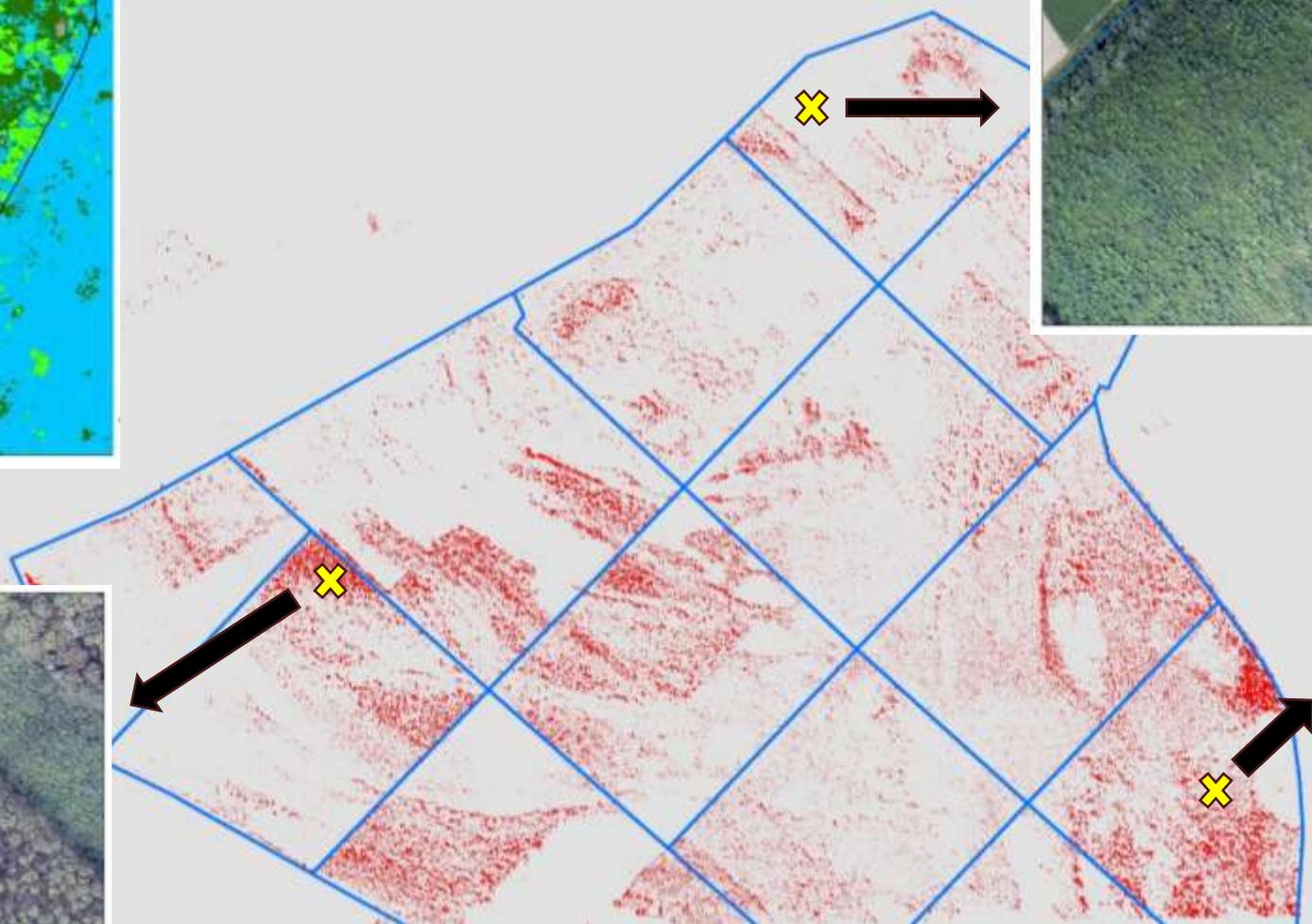
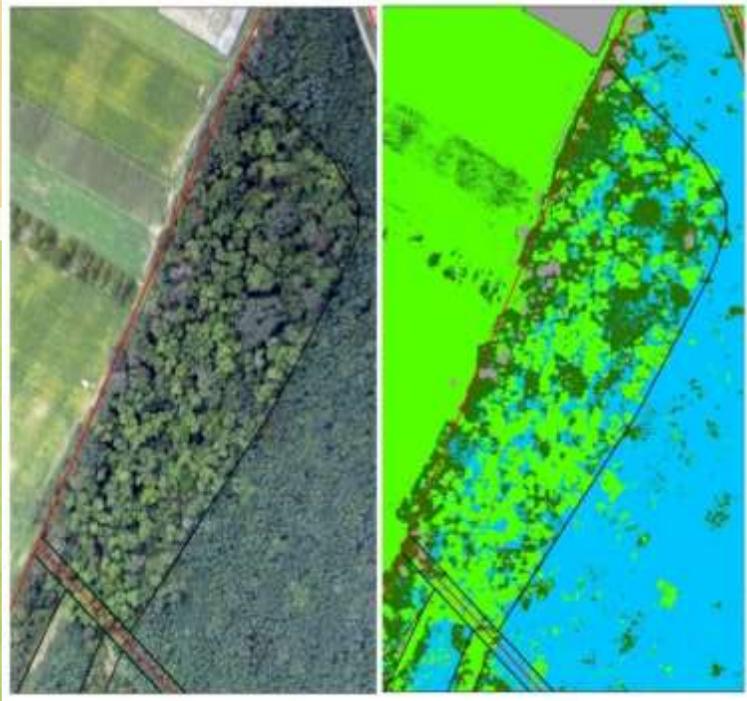
Firmware version: n/a

Serial number: n/a

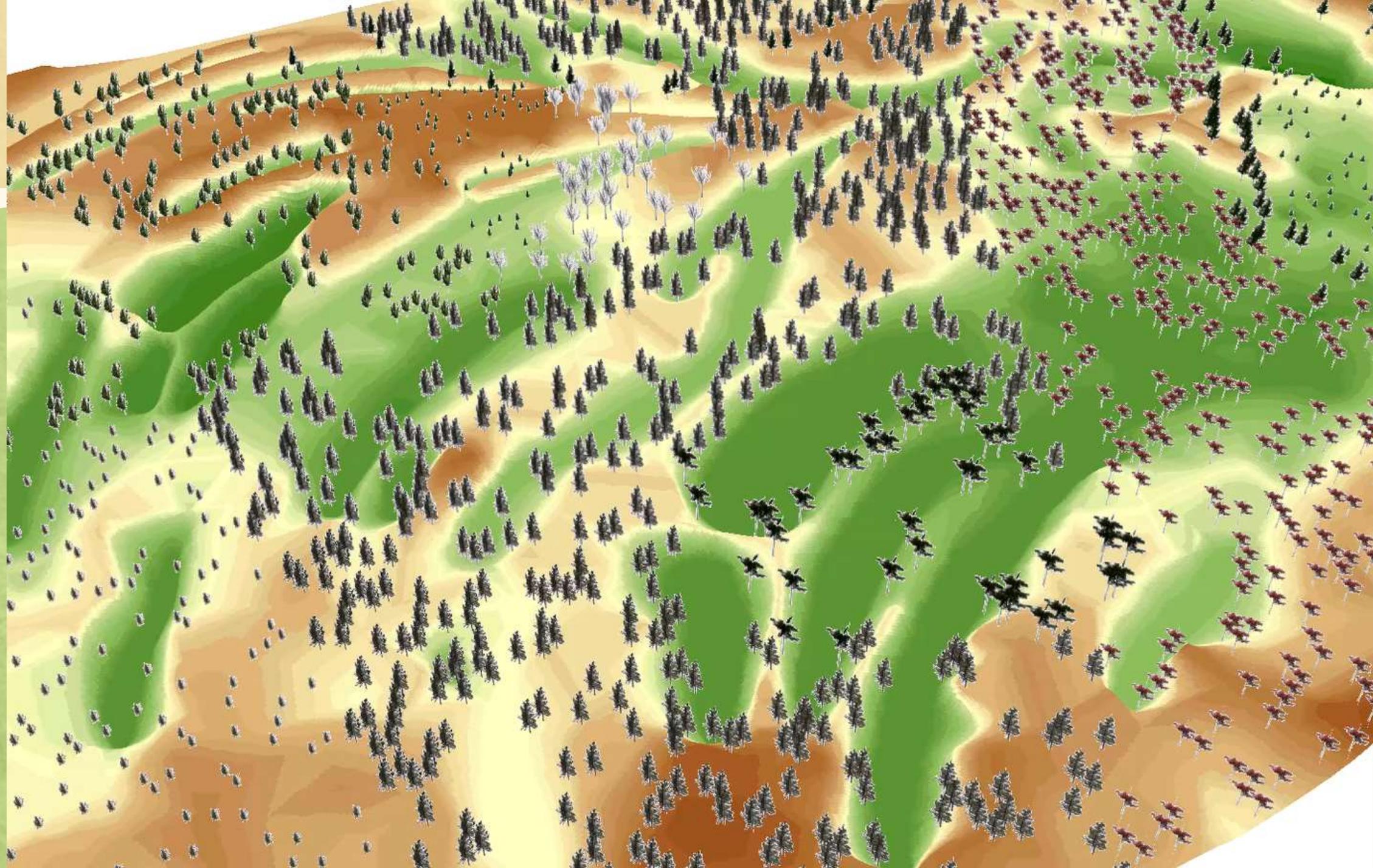
Launching:



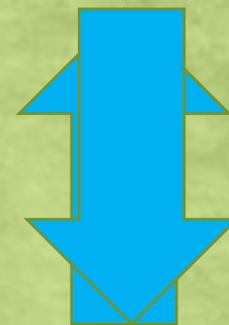




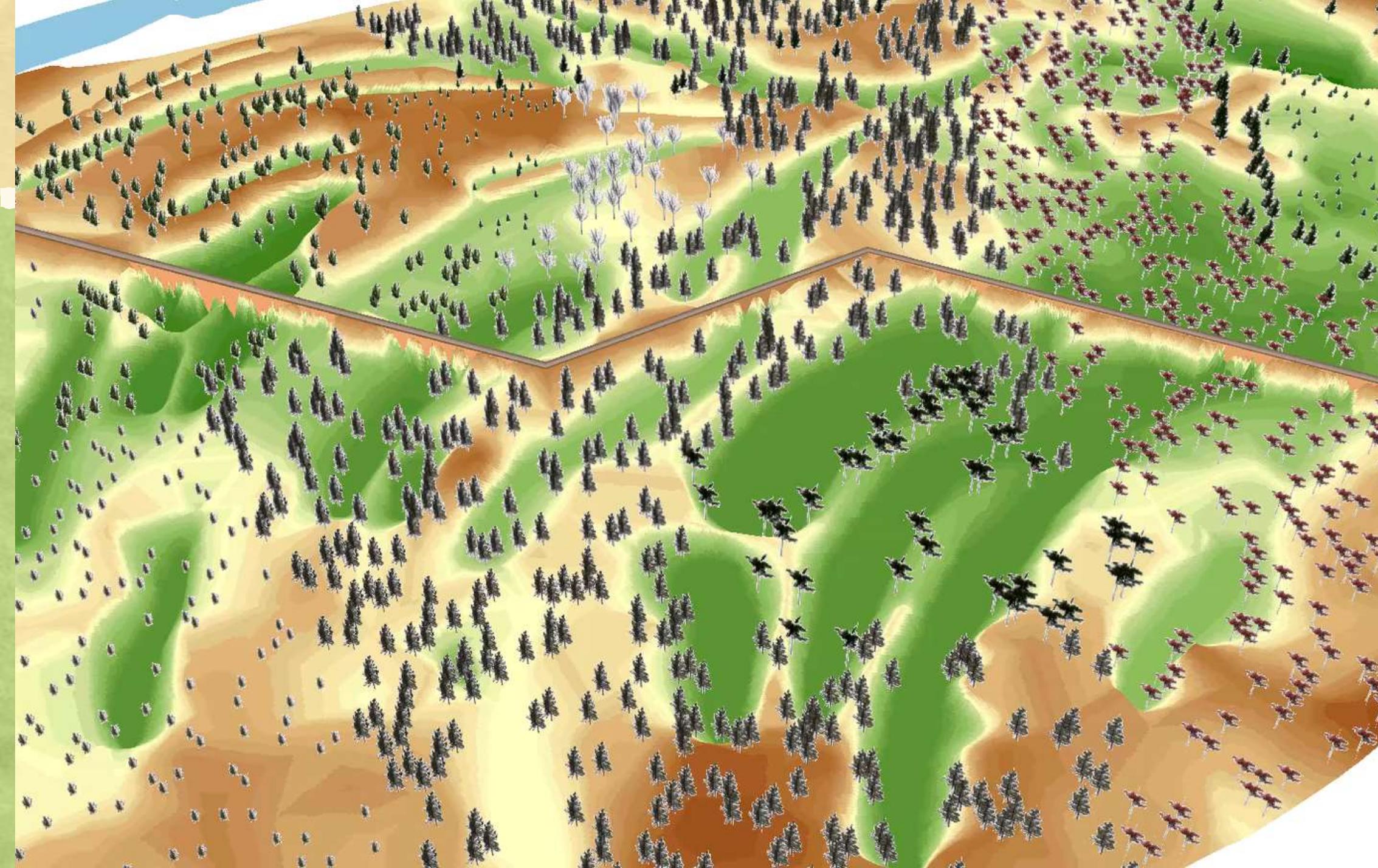
Supervised classification



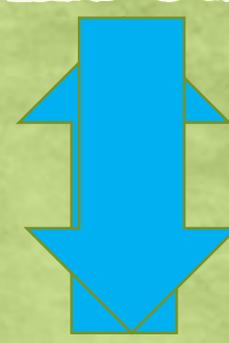
Water
level
without
road



73.9 m

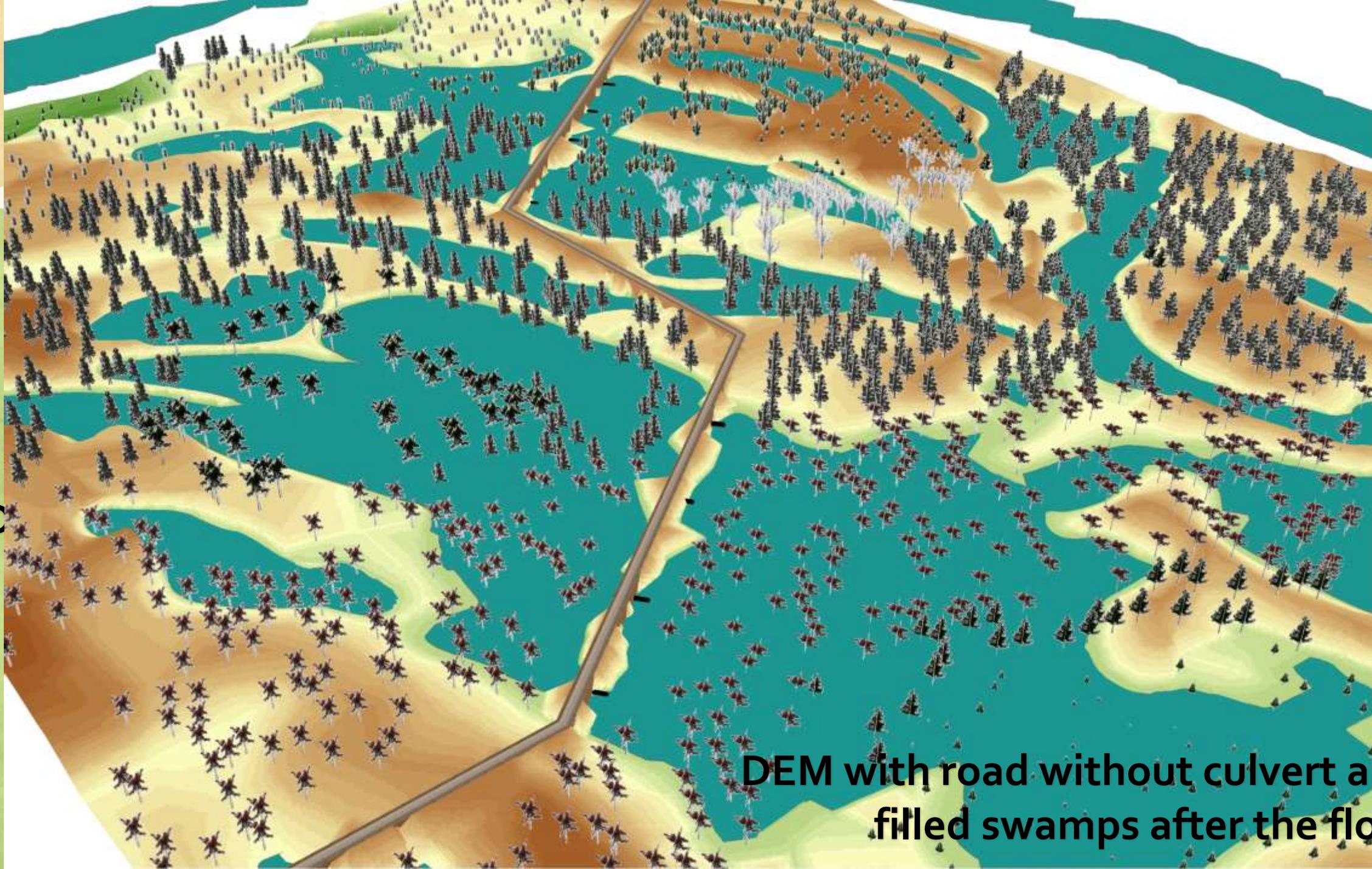


Water level with road

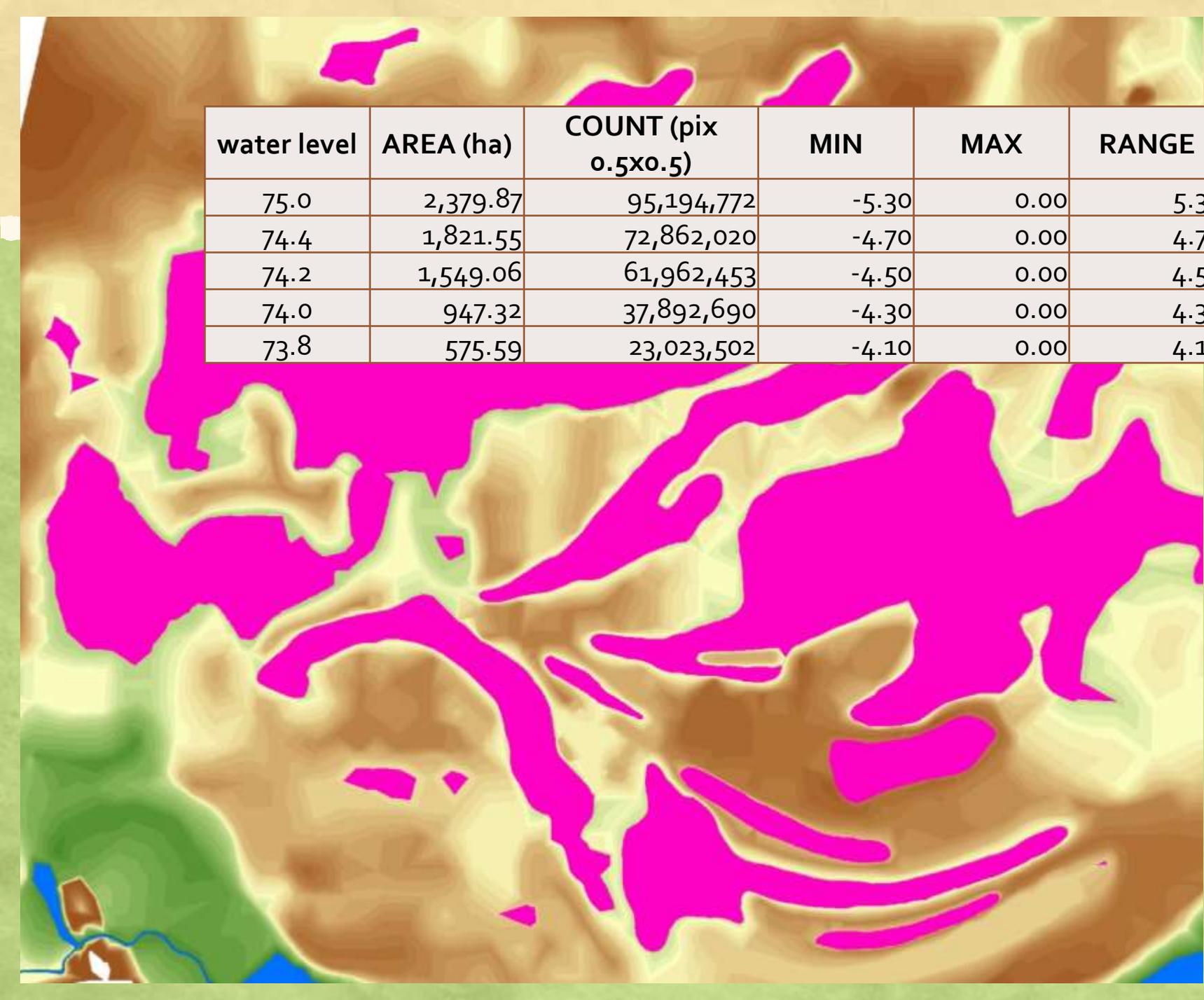


73.9 m

D



DEM with road without culvert and filled swamps after the flood



The image shows a topographic map with a color gradient from green (low elevation) to brown (high elevation). A red overlay highlights a specific contour line, likely representing a water level. The table below provides statistical data for this contour.

water level	AREA (ha)	COUNT (pix 0.5x0.5)	MIN	MAX	RANGE	MEAN	STD	Water (m3)
75.0	2,379.87	95,194,772	-5.30	0.00	5.30	-1.17	0.72	27,727,839.39
74.4	1,821.55	72,862,020	-4.70	0.00	4.70	-0.81	0.64	14,811,298.74
74.2	1,549.06	61,962,453	-4.50	0.00	4.50	-0.73	0.62	11,352,032.47
74.0	947.32	37,892,690	-4.30	0.00	4.30	-0.82	0.59	7,759,482.13
73.8	575.59	23,023,502	-4.10	0.00	4.10	-0.88	0.57	5,069,694.02

	SHP gridcode	water depth	AREA (ha)	COUNT (pix 0.5x0.5)	MIN	MAX	RANGE	MEAN	STD	Water (m3)
81 m	1	0-1 m	8,842.74	353,709,659	-1.00	0.00	1.00	-0.52	0.28	46,346,978.08
	2	1-2 m	5,846.01	233,840,394	-1.99	-1.00	0.99	-1.41	0.28	82,529,034.78
	3	2-3 m	1,969.00	78,759,988	-2.99	-2.00	0.99	-2.39	0.28	47,137,635.00
	4	3-4 m	427.58	17,103,344	-3.99	-3.00	0.99	-3.37	0.27	14,424,959.77
	5	4-5 m	707.83	28,313,272	-4.99	-4.00	0.99	-4.56	0.24	32,282,830.34
	6	5-6 m	659.13	26,365,050	-5.99	-5.00	0.99	-5.63	0.27	37,100,698.54
	7	6-6.77 m	5.17	206,686	-6.77	-6.00	0.77	-6.14	0.16	317,049.48
		SUM	18,457.46	738,298,395						260,139,186.00
	SHP gridcode	water depth	AREA (ha)	COUNT (pix 0.5x0.5)	MIN	MAX	RANGE	MEAN	STD	Water (m3)
80 m	1	0-1 m	5,844.37	233,774,675	-0.99	0.00	0.99	-0.41	0.28	24,062,043.98
	2	1-2 m	1,968.43	78,737,370	-1.99	-1.00	0.99	-1.39	0.28	27,439,787.30
	3	2-3 m	427.48	17,099,325	-2.99	-2.00	0.99	-2.37	0.27	10,146,769.87
	4	3-4 m	707.63	28,305,262	-3.99	-3.00	0.99	-3.56	0.24	25,197,329.86
	5	4-5 m	659.01	26,360,543	-4.99	-4.00	0.99	-4.63	0.27	30,504,309.35
	6	5-5.7 m	5.17	206,666	-5.77	-5.00	0.77	-5.14	0.16	265,352.23
		SUM	9,612.10	384,483,841						117,615,592.59
	SHP gridcode	water depth	AREA (ha)	COUNT (pix 0.5x0.5)	MIN	MAX	RANGE	MEAN	STD	Water (m3)
79 m	1	0-1 m	1,968.43	78,737,370	-0.99	0.00	0.99	-0.39	0.28	7,755,444.89
	2	1-2 m	427.48	17,099,325	-1.99	-1.00	0.99	-1.37	0.27	5,871,938.72
	3	2-3 m	707.63	28,305,262	-2.99	-2.00	0.99	-2.56	0.24	18,121,014.25
	4	3-4 m	659.01	26,360,543	-3.99	-3.00	0.99	-3.63	0.27	23,914,173.51
	5	4-4.7 m	5.17	206,666	-4.77	-4.00	0.77	-4.14	0.16	213,685.75
		SUM	3,767.73	150,709,166						55,876,257.13
	SHP gridcode	water depth	AREA (ha)	COUNT (pix 0.5x0.5)	MIN	MAX	RANGE	MEAN	STD	Water (m3)
78 m	1	0-1 m	427.48	17,099,325	-0.99	0.00	0.99	-0.37	0.27	1,597,107.58
	2	1-2 m	707.63	28,305,262	-1.99	-1.00	0.99	-1.56	0.24	11,044,698.63
	3	2-3 m	659.01	26,360,543	-2.99	-2.00	0.99	-2.63	0.27	17,324,037.68
	4	3-3.7 m	5.17	206,666	-3.77	-3.00	0.77	-3.14	0.16	162,019.27
		SUM	1,799.29	71,971,796						30,127,863.15







Elevation

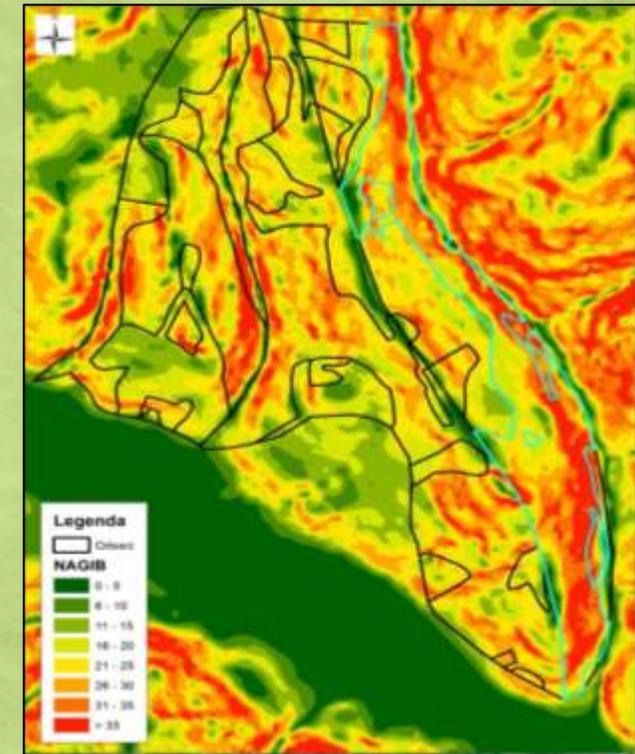
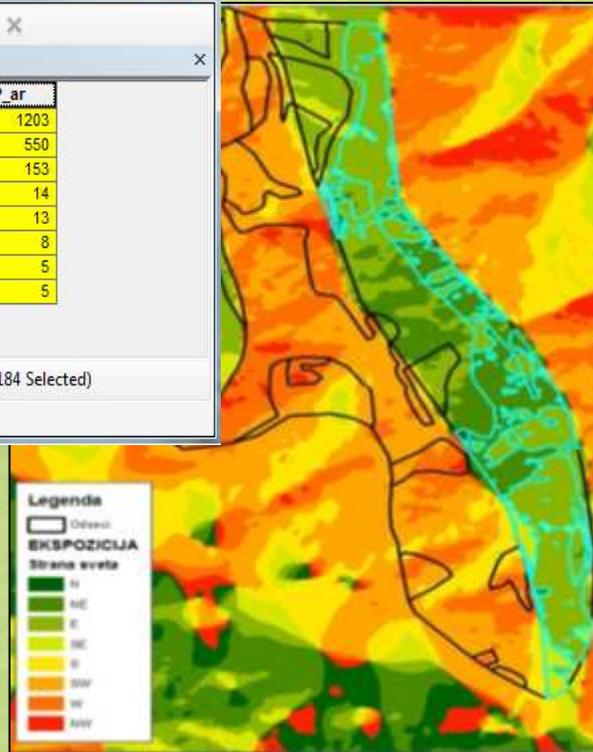
Table

EKSPozICIJA_ODSEK

Odeljenje	Odseci	Ekspozicij	P_ar
24	a	E	1203
24	a	NE	550
24	a	SE	153
24	a	S	14
24	a	N	13
24	a	W	8
24	a	SW	5
24	a	NW	5

(8 out of 184 Selected)

Aspect

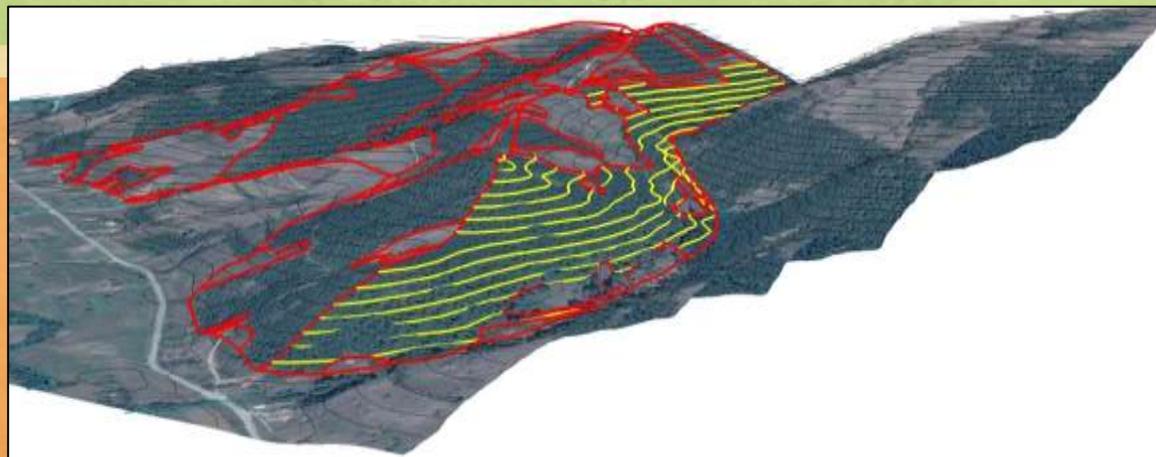


Slope

Izohipse

Odeljenje	Odseci	Elevation
24	a	320
24	a	320
24	a	320
24	a	310
24	a	310
24	a	310
24	a	300
24	a	300
24	a	290
24	a	280
24	a	280
24	a	270
24	a	270
24	a	260
24	a	250
24	a	240
24	a	230
24	a	230
24	a	220
24	a	210
24	a	200
24	a	200
24	a	190

(0 out of 18 Selected)



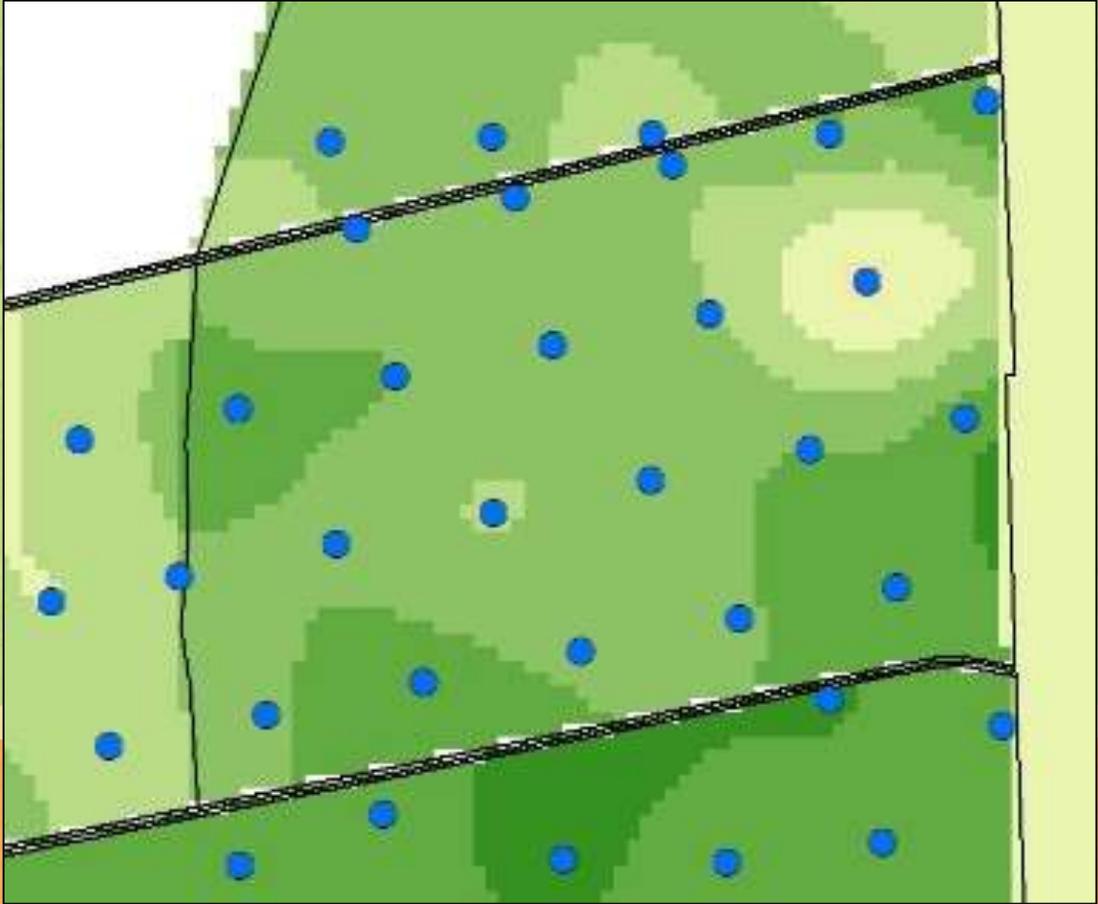
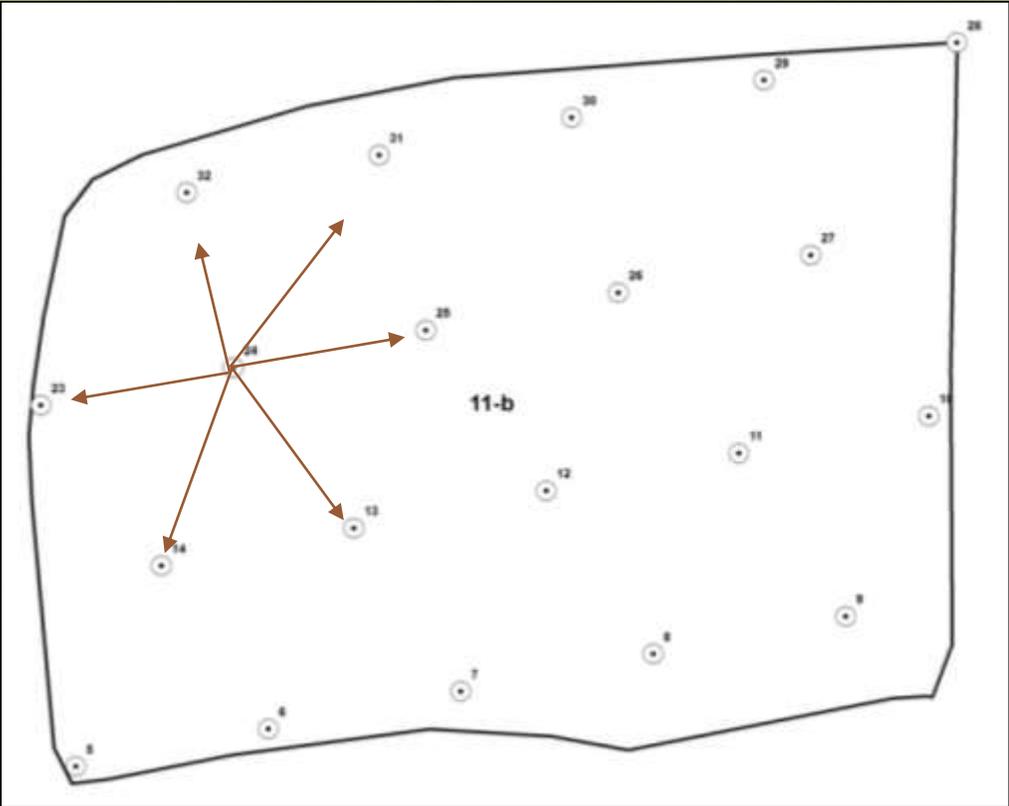
Table

NAGIB_ODSJEK

Odeljenje	Odseci	Nagib	P_ar
24	a	> 35	424
24	a	31 - 35	365
24	a	26 - 30	356
24	a	21 - 25	349
24	a	16 - 20	250
24	a	11 - 15	99
24	a	6 - 10	68
24	a	0 - 5	40

(8 out of 255 Selected)

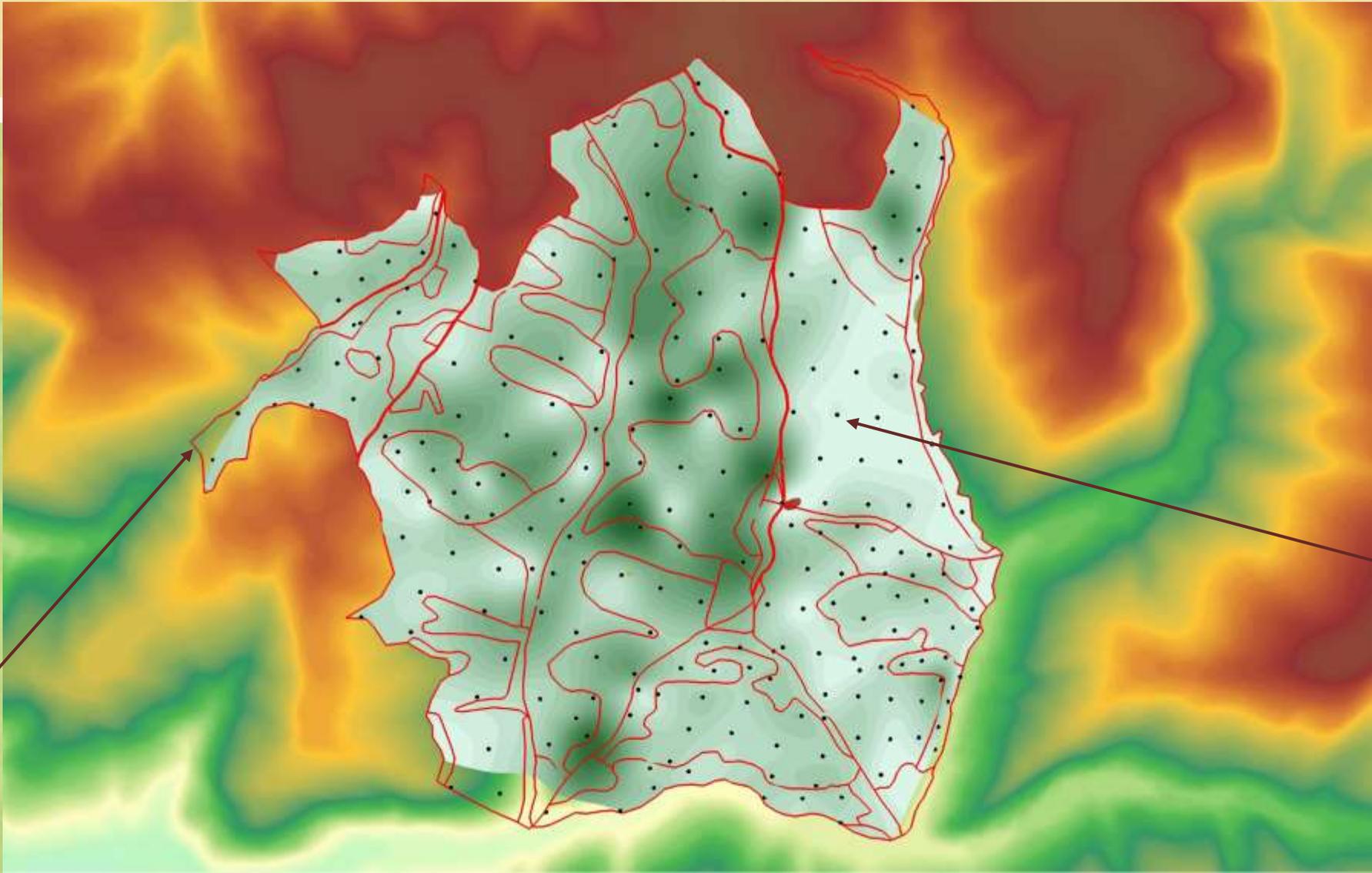
Distribution sample plots over forest stand



11-b 21 129,3143711 615 100

⏪ ◀ 0 ▶ ⏩ | (0 out of 20 Selected)

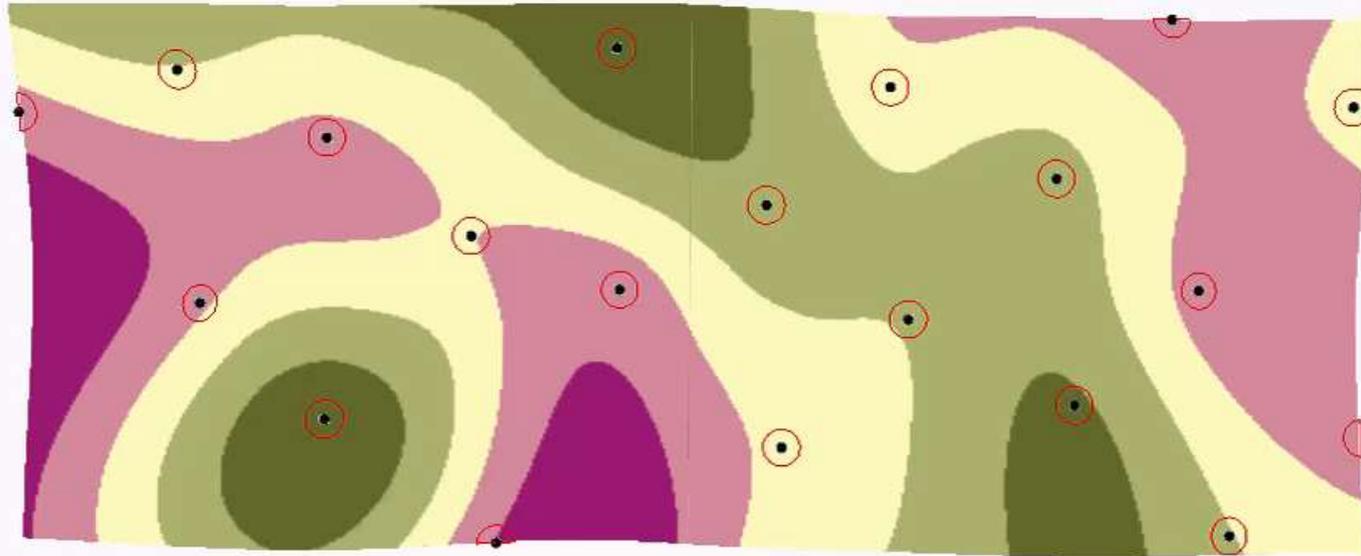
Krugovi



Forest stands

Forest inventory plots

RASTER CALCULATOR:



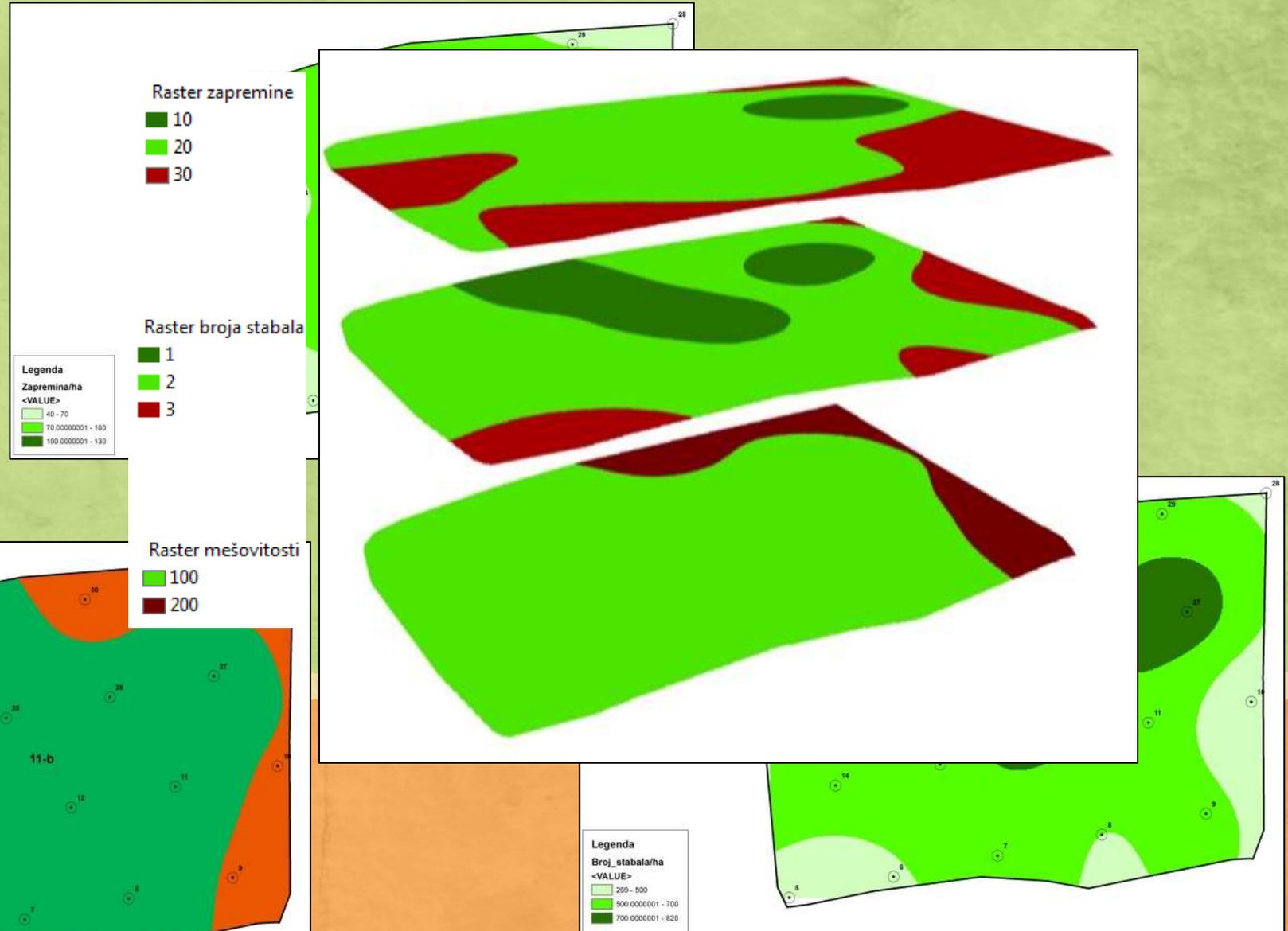
2013

2003

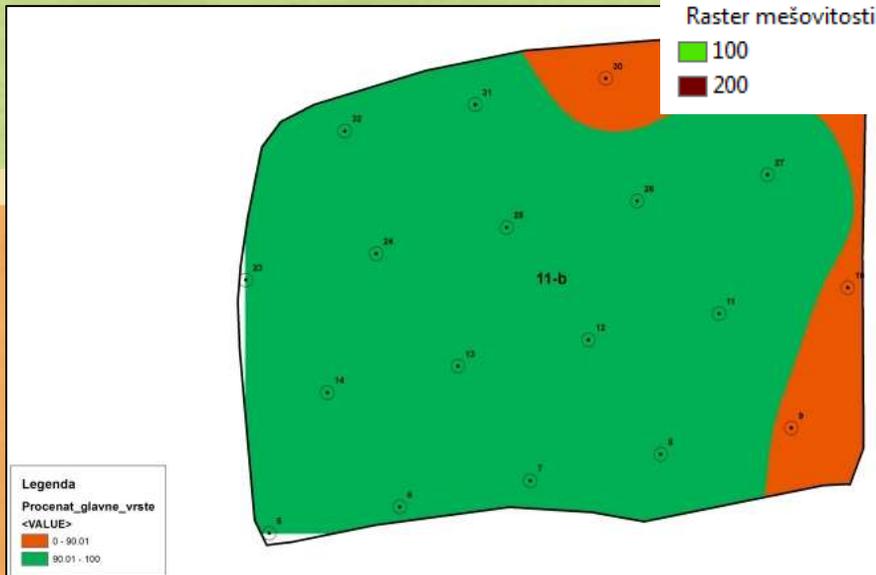
difference between
two forest
inventories

- Raster development from inventory data
- Tools for analyses: Spline, IDW, Kriging etc.
- Statistical support
- Combination of different rasters

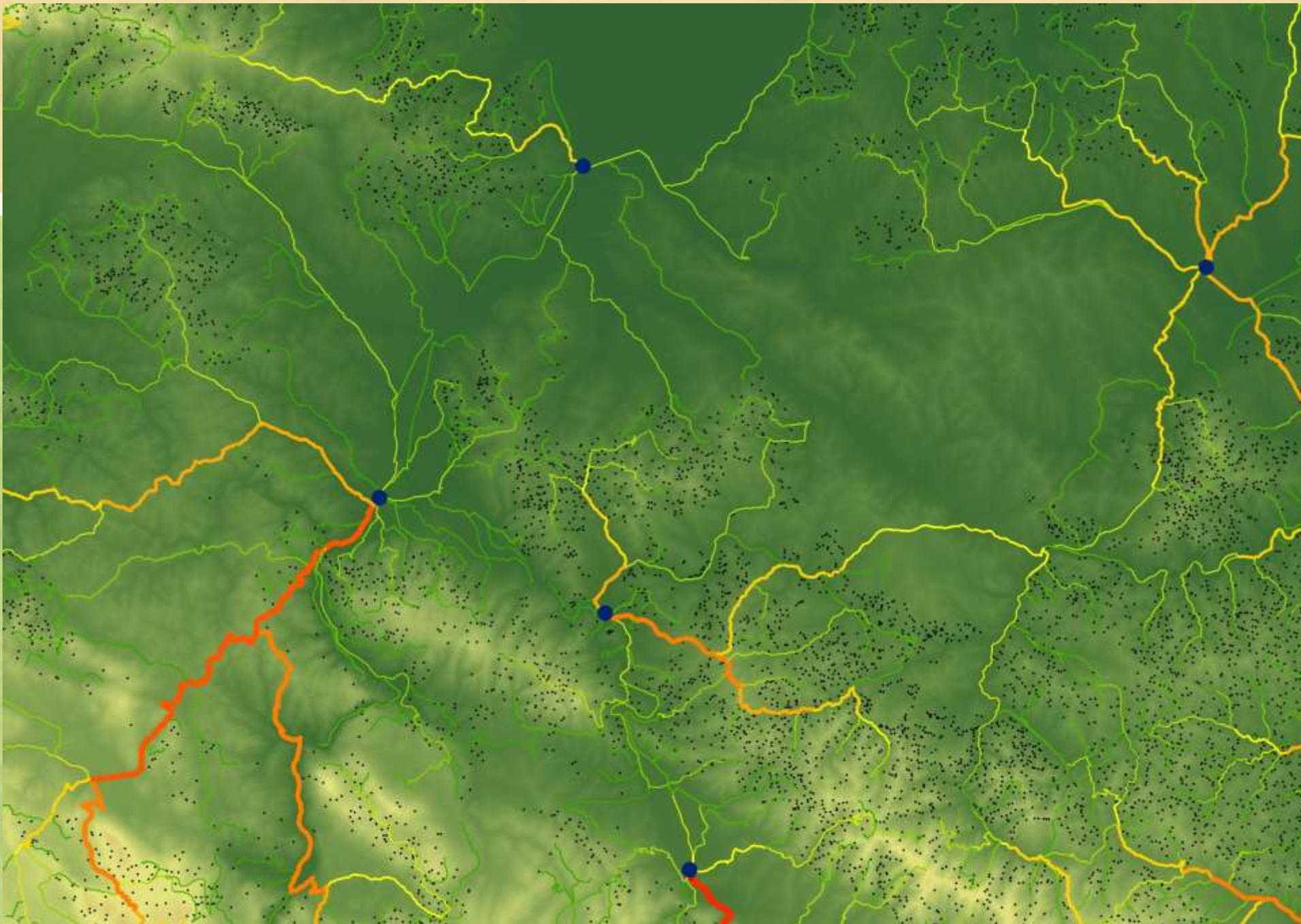
Raster of volume:



Raster: Tree species ratio



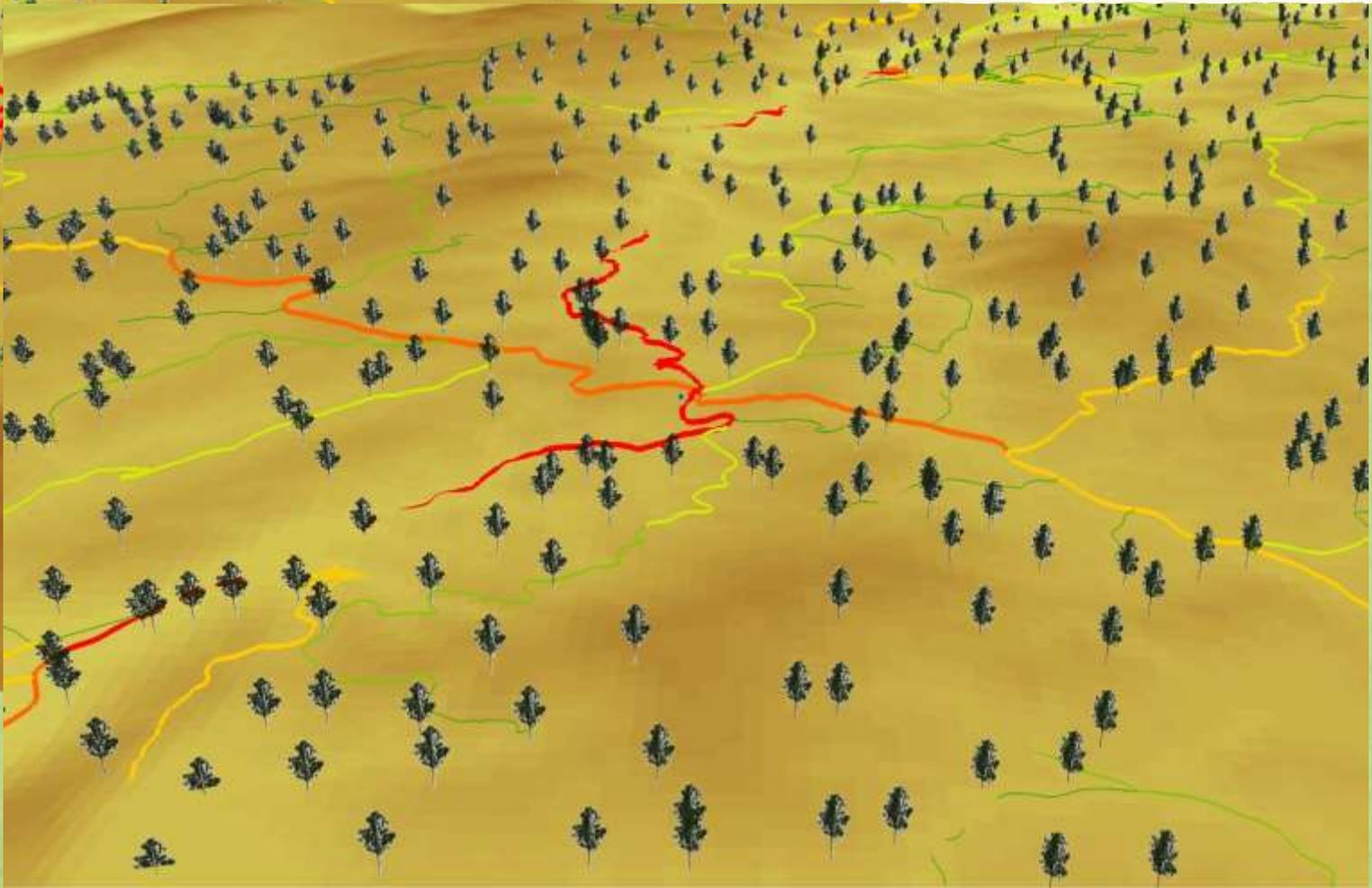
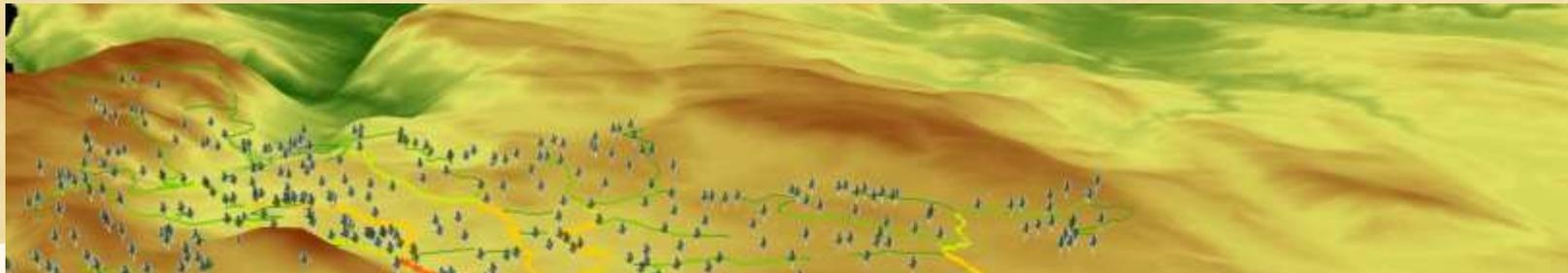
Calculating timber loads on public and forest roads



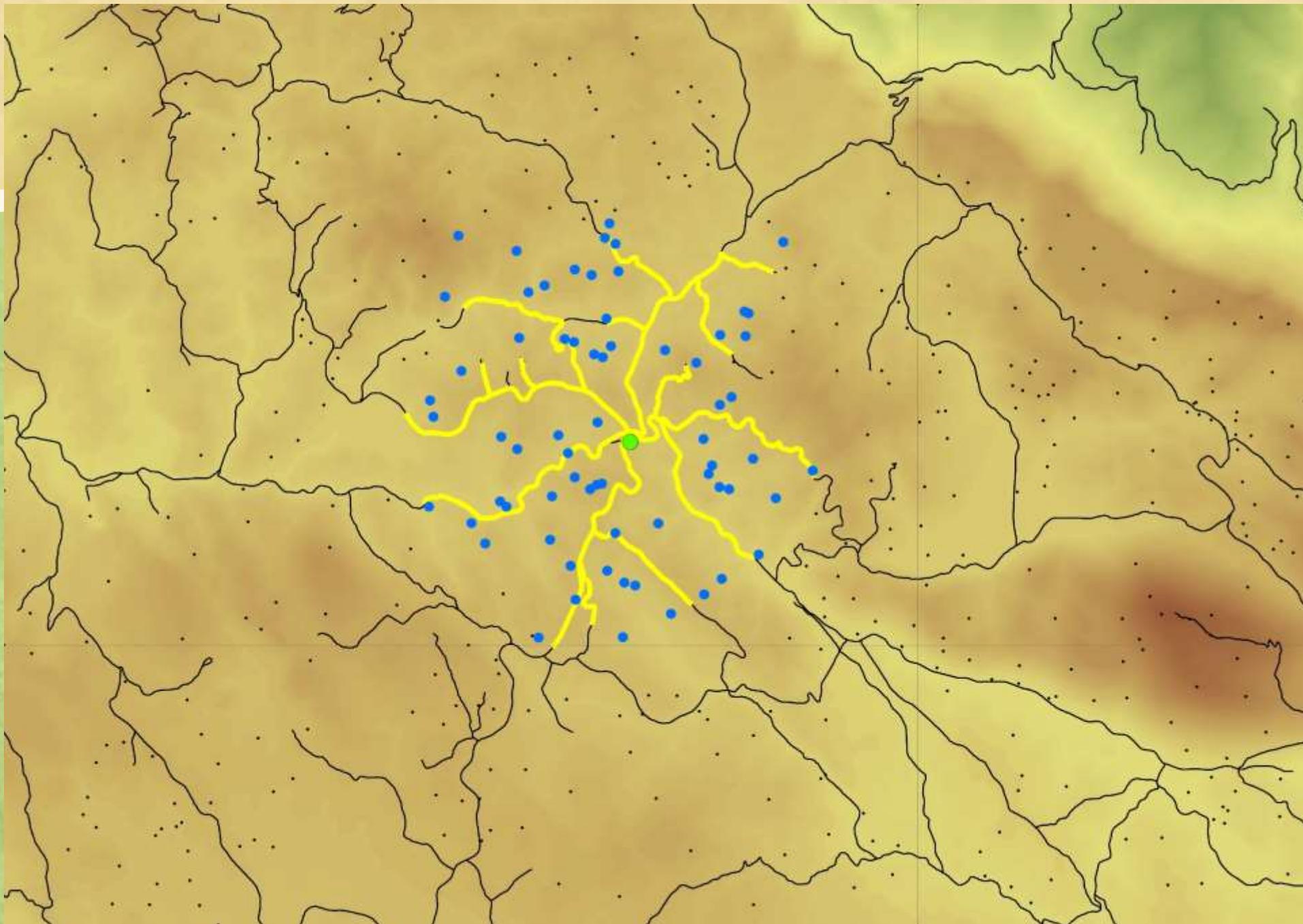
• Centroid of timber
volumes based on stands

— Roads

● - industrial wood
processing centers



Analyses of local demand of firewood



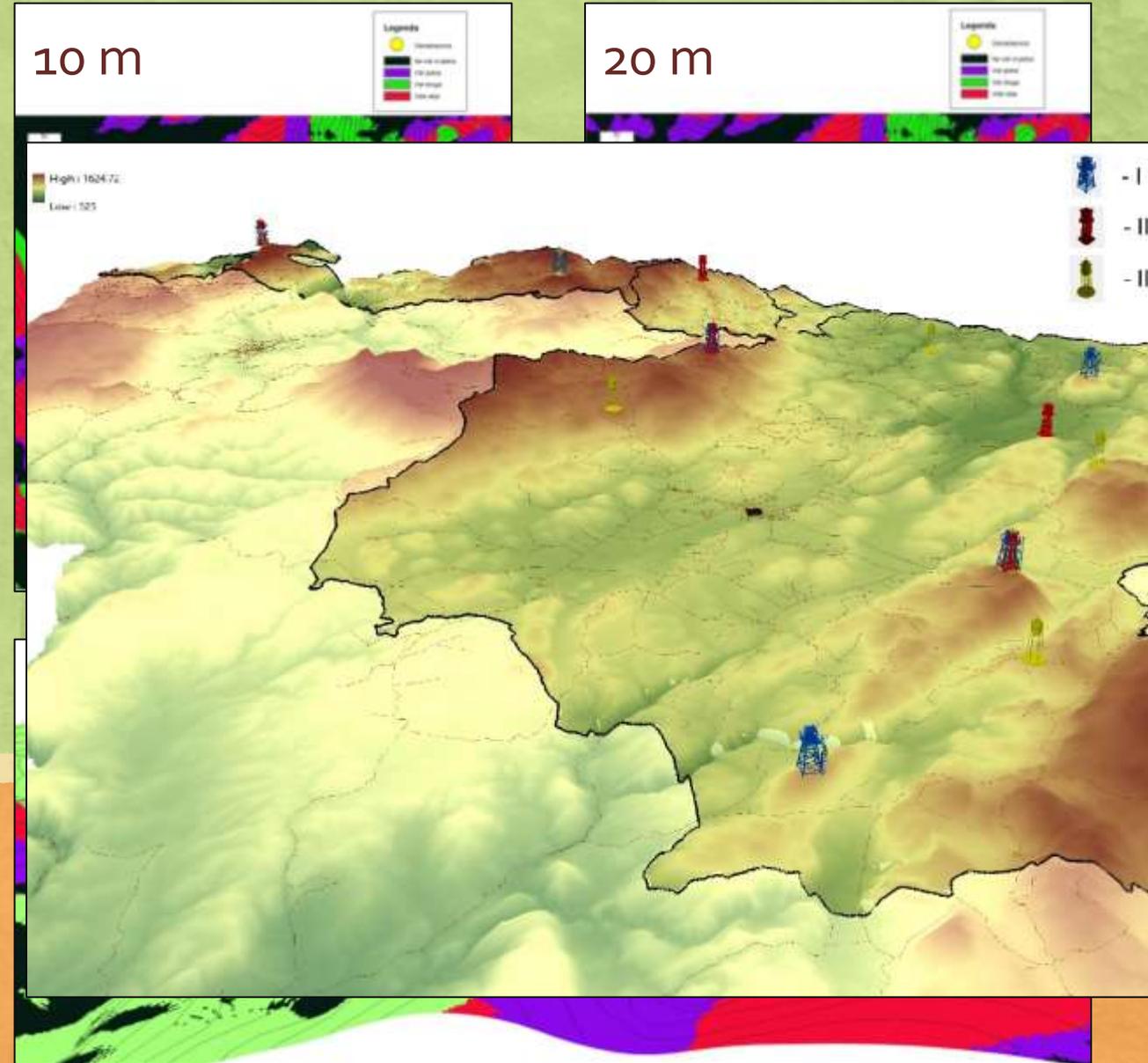
• Centroid of timber volumes based on stands

— - Roads

● - industrial wood processing centers

Wathctowers in fire preventions

- Optimization of watchtower positions
- Visible area only from one watchtower
- Visible area from all watchtower (overlapping)
- Black spots
- Analyses for different types of watchtower
- Analyses visible area from highest elevation (where is not posible to build wathctowers)



**GIS CAN'T KICK OUT RUBBER BOOTS!!!
BUT IT HELPS IN DECISIONS ...**

