

From hidden to on-line, the case of Horta's cadastral map

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GEHC



Summary

- Background
- Horta's cadastral Map from 1861
- Historical cartography and GIS
- DEM Integration
- Results
- Conclusions

Background

- Between 1845 and 1895 a change in the Spanish legislation forced many **Catalan councils** to create cadastral cartography
- **At least** 187 Catalan towns hired surveyors who created at least 252 maps
- Since these maps have information about land use, they are a window to the landscape which existed in the 19th century
- However, only a few studies have taken advantage of this source of information

Background

- Maps are currently scattered and in different levels of conservation
- Almost all of them are manuscript
- It is necessary to extract the information contained in these maps and make it available to the public
- This presentation shows how the map from Horta was used to extract the information, integrate it within a 3D environment and to distribute it on-line

Horta's cadastral Map from 1861

Horta's cadastral Map from 1861

- Is one of the 12 maps done of what nowadays is Barcelona

| Town | Author | Year |
|-------------------------------------|-------------------------|--------|
| Barcelona | Soler i Mestres, Joan | [1851] |
| Barcelona | Soler i Mestres, Joan | [1851] |
| Barcelona | Soler i Mestres, Joan | 1851 |
| Barcelona: Gràcia | Soler i Mestres, Joan | [1851] |
| Barcelona: Horta | Serra i Bonet, Joan | 1861 |
| Barcelona: Sant Marti de Provençals | Presas i Puig, Llorenç | [1851] |
| Barcelona: Sant Marti de Provençals | Moreno y Ramirez, Pedro | [1871] |
| Barcelona: Sant Marti de Provençals | Presas i Puig, Llorenç | 1853 |
| Barcelona: Sant Marti de Provençals | Moreno y Ramirez, Pedro | 1871 |
| Barcelona: Sant Marti de Provençals | Moreno y Ramirez, Pedro | 1871 |
| Barcelona: Santa Creu d'Olorda | Moreno y Ramirez, Pedro | [1856] |
| Barcelona: Vallvidrera | Busquets, Josep | [1859] |

Horta's cadastral Map from 1861

- Technical description:
 - *Plano geométrico del pueblo y término de San Juan de Horta*
 - Joan Serra i Bonet
 - Handmade and in colour
 - 1:5.000, 105 x 136 cms
 - Oriented towards the NW
 - 320 plots with information (323 in total) divided into 5 zones
 - Located in the Municipal Archive of Barcelona

| Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area |
|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|
| 1. San Antonio | 1.00 | 11. San Antonio | 1.00 | 21. San Antonio | 1.00 | 31. San Antonio | 1.00 | 41. San Antonio | 1.00 |
| 2. San Antonio | 1.00 | 12. San Antonio | 1.00 | 22. San Antonio | 1.00 | 32. San Antonio | 1.00 | 42. San Antonio | 1.00 |
| 3. San Antonio | 1.00 | 13. San Antonio | 1.00 | 23. San Antonio | 1.00 | 33. San Antonio | 1.00 | 43. San Antonio | 1.00 |
| 4. San Antonio | 1.00 | 14. San Antonio | 1.00 | 24. San Antonio | 1.00 | 34. San Antonio | 1.00 | 44. San Antonio | 1.00 |
| 5. San Antonio | 1.00 | 15. San Antonio | 1.00 | 25. San Antonio | 1.00 | 35. San Antonio | 1.00 | 45. San Antonio | 1.00 |
| 6. San Antonio | 1.00 | 16. San Antonio | 1.00 | 26. San Antonio | 1.00 | 36. San Antonio | 1.00 | 46. San Antonio | 1.00 |
| 7. San Antonio | 1.00 | 17. San Antonio | 1.00 | 27. San Antonio | 1.00 | 37. San Antonio | 1.00 | 47. San Antonio | 1.00 |
| 8. San Antonio | 1.00 | 18. San Antonio | 1.00 | 28. San Antonio | 1.00 | 38. San Antonio | 1.00 | 48. San Antonio | 1.00 |
| 9. San Antonio | 1.00 | 19. San Antonio | 1.00 | 29. San Antonio | 1.00 | 39. San Antonio | 1.00 | 49. San Antonio | 1.00 |
| 10. San Antonio | 1.00 | 20. San Antonio | 1.00 | 30. San Antonio | 1.00 | 40. San Antonio | 1.00 | 50. San Antonio | 1.00 |

PLANO GEOMÉTRICO DEL PUEBLO Y TÉRMINO DE SAN JUAN DE NORTA Levantado por el Geómetra DON JUAN SERRA Y BUNET. 1861

| Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area |
|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|
| 1. San Antonio | 1.00 | 11. San Antonio | 1.00 | 21. San Antonio | 1.00 | 31. San Antonio | 1.00 | 41. San Antonio | 1.00 |
| 2. San Antonio | 1.00 | 12. San Antonio | 1.00 | 22. San Antonio | 1.00 | 32. San Antonio | 1.00 | 42. San Antonio | 1.00 |
| 3. San Antonio | 1.00 | 13. San Antonio | 1.00 | 23. San Antonio | 1.00 | 33. San Antonio | 1.00 | 43. San Antonio | 1.00 |
| 4. San Antonio | 1.00 | 14. San Antonio | 1.00 | 24. San Antonio | 1.00 | 34. San Antonio | 1.00 | 44. San Antonio | 1.00 |
| 5. San Antonio | 1.00 | 15. San Antonio | 1.00 | 25. San Antonio | 1.00 | 35. San Antonio | 1.00 | 45. San Antonio | 1.00 |
| 6. San Antonio | 1.00 | 16. San Antonio | 1.00 | 26. San Antonio | 1.00 | 36. San Antonio | 1.00 | 46. San Antonio | 1.00 |
| 7. San Antonio | 1.00 | 17. San Antonio | 1.00 | 27. San Antonio | 1.00 | 37. San Antonio | 1.00 | 47. San Antonio | 1.00 |
| 8. San Antonio | 1.00 | 18. San Antonio | 1.00 | 28. San Antonio | 1.00 | 38. San Antonio | 1.00 | 48. San Antonio | 1.00 |
| 9. San Antonio | 1.00 | 19. San Antonio | 1.00 | 29. San Antonio | 1.00 | 39. San Antonio | 1.00 | 49. San Antonio | 1.00 |
| 10. San Antonio | 1.00 | 20. San Antonio | 1.00 | 30. San Antonio | 1.00 | 40. San Antonio | 1.00 | 50. San Antonio | 1.00 |

| Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area |
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| 2. San Antonio | 1.00 | 12. San Antonio | 1.00 | 22. San Antonio | 1.00 | 32. San Antonio | 1.00 | 42. San Antonio | 1.00 |
| 3. San Antonio | 1.00 | 13. San Antonio | 1.00 | 23. San Antonio | 1.00 | 33. San Antonio | 1.00 | 43. San Antonio | 1.00 |
| 4. San Antonio | 1.00 | 14. San Antonio | 1.00 | 24. San Antonio | 1.00 | 34. San Antonio | 1.00 | 44. San Antonio | 1.00 |
| 5. San Antonio | 1.00 | 15. San Antonio | 1.00 | 25. San Antonio | 1.00 | 35. San Antonio | 1.00 | 45. San Antonio | 1.00 |
| 6. San Antonio | 1.00 | 16. San Antonio | 1.00 | 26. San Antonio | 1.00 | 36. San Antonio | 1.00 | 46. San Antonio | 1.00 |
| 7. San Antonio | 1.00 | 17. San Antonio | 1.00 | 27. San Antonio | 1.00 | 37. San Antonio | 1.00 | 47. San Antonio | 1.00 |
| 8. San Antonio | 1.00 | 18. San Antonio | 1.00 | 28. San Antonio | 1.00 | 38. San Antonio | 1.00 | 48. San Antonio | 1.00 |
| 9. San Antonio | 1.00 | 19. San Antonio | 1.00 | 29. San Antonio | 1.00 | 39. San Antonio | 1.00 | 49. San Antonio | 1.00 |
| 10. San Antonio | 1.00 | 20. San Antonio | 1.00 | 30. San Antonio | 1.00 | 40. San Antonio | 1.00 | 50. San Antonio | 1.00 |



| Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area | Registrazione | Area |
|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|
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| 6. San Antonio | 1.00 | 16. San Antonio | 1.00 | 26. San Antonio | 1.00 | 36. San Antonio | 1.00 | 46. San Antonio | 1.00 |
| 7. San Antonio | 1.00 | 17. San Antonio | 1.00 | 27. San Antonio | 1.00 | 37. San Antonio | 1.00 | 47. San Antonio | 1.00 |
| 8. San Antonio | 1.00 | 18. San Antonio | 1.00 | 28. San Antonio | 1.00 | 38. San Antonio | 1.00 | 48. San Antonio | 1.00 |
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| 10. San Antonio | 1.00 | 20. San Antonio | 1.00 | 30. San Antonio | 1.00 | 40. San Antonio | 1.00 | 50. San Antonio | 1.00 |



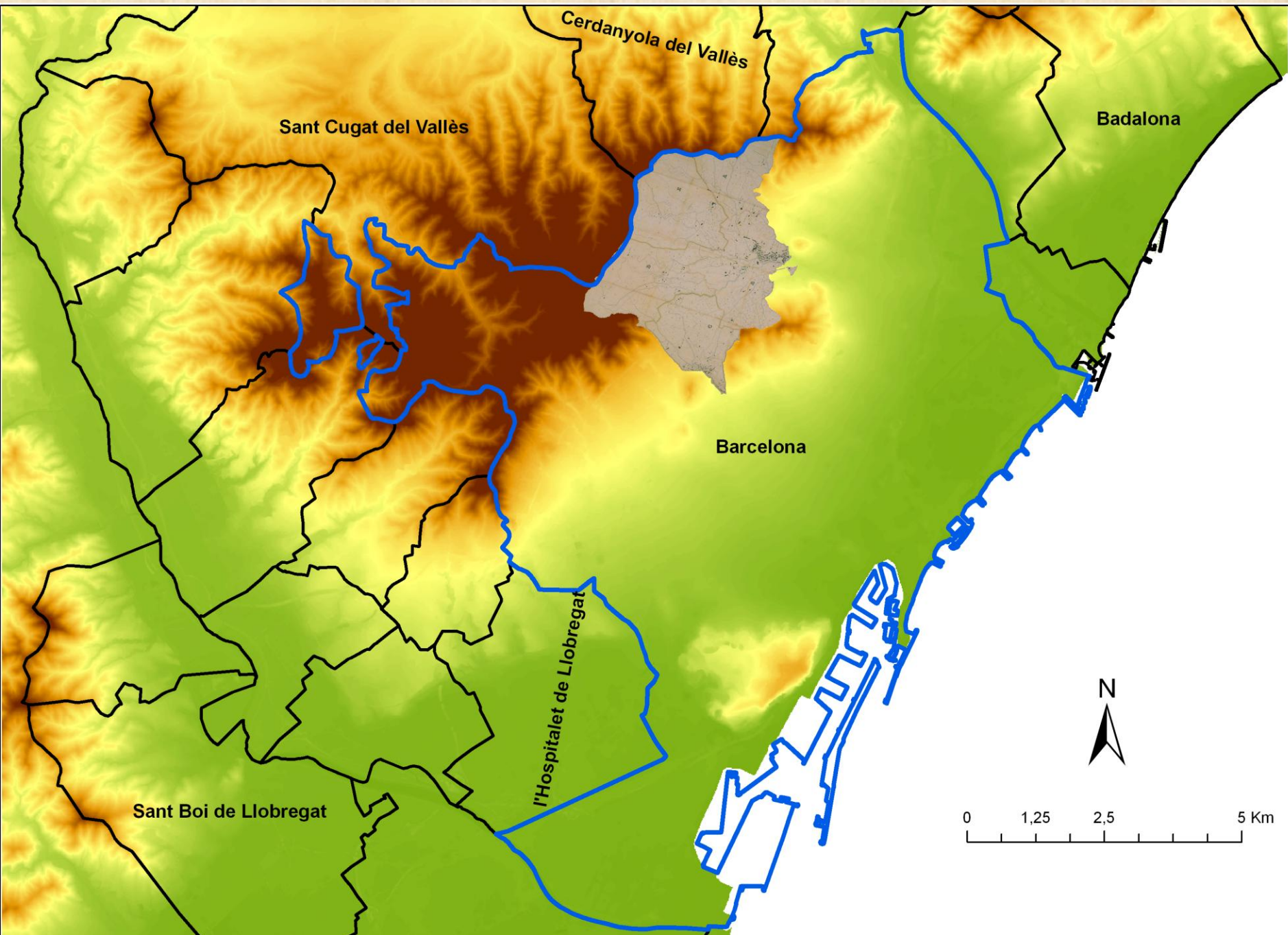
| No. | Proprietario | May | Mun. | No. | Proprietario | May | Mun. |
|-----|---------------------|-----|------|-----|-----------------------|-----|------|
| 1 | José Antonio Jarama | 3 | 6 | 2 | Yolvo Dethon | 1 | 16 |
| 2 | Juan Silva y Arana | 3 | 23 | 3 | Francisco Colanin | 1 | 16 |
| 3 | José Antonio Jarama | 1 | - | 10 | Gerardo Magranda | 2 | 7 |
| 4 | Josefa Brasa | 2 | 4 | 14 | Valentin Dethon | 1 | 16 |
| 5 | Sebastián Frate | 2 | - | 15 | Juan Salabriga | 22 | 1 |
| 6 | Ramón de Branda | 4 | 23 | 16 | Juan Casas y Juan | 2 | 8 |
| 7 | Jaime Vellamonte | 6 | 4 | 17 | José Campesino | 15 | 2 |
| 8 | José Palabriga | | 11 | 18 | José Magranda y Domas | 1 | 16 |
| 9 | José Manrí | 1 | 2 | 19 | Yolvo Frate | 2 | 28 |
| 10 | Sebastián Magranda | 2 | 4 | 20 | Man' de Salabriga | 14 | 23 |

Historical cartography and GIS

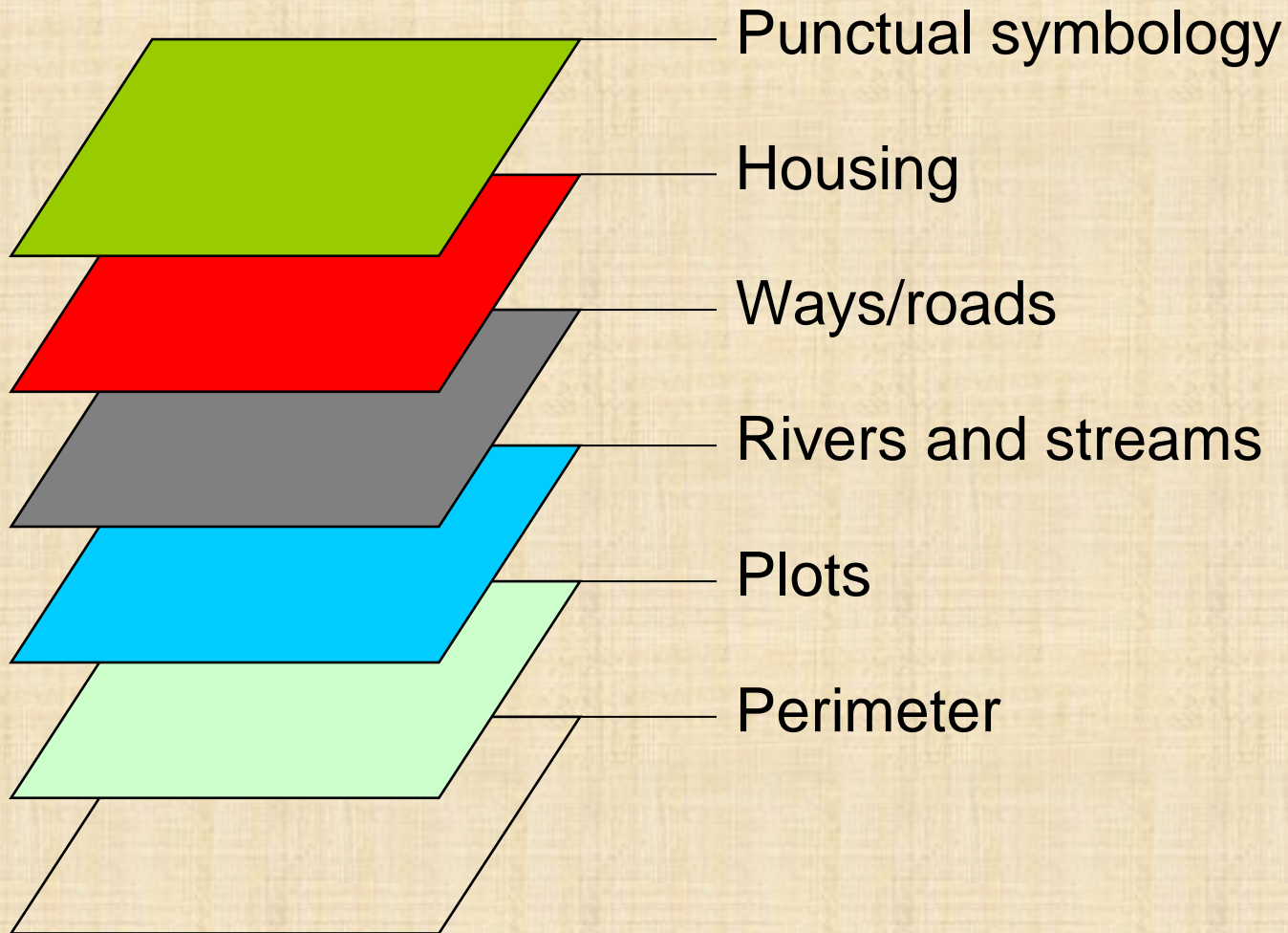
Historical cartography and GIS

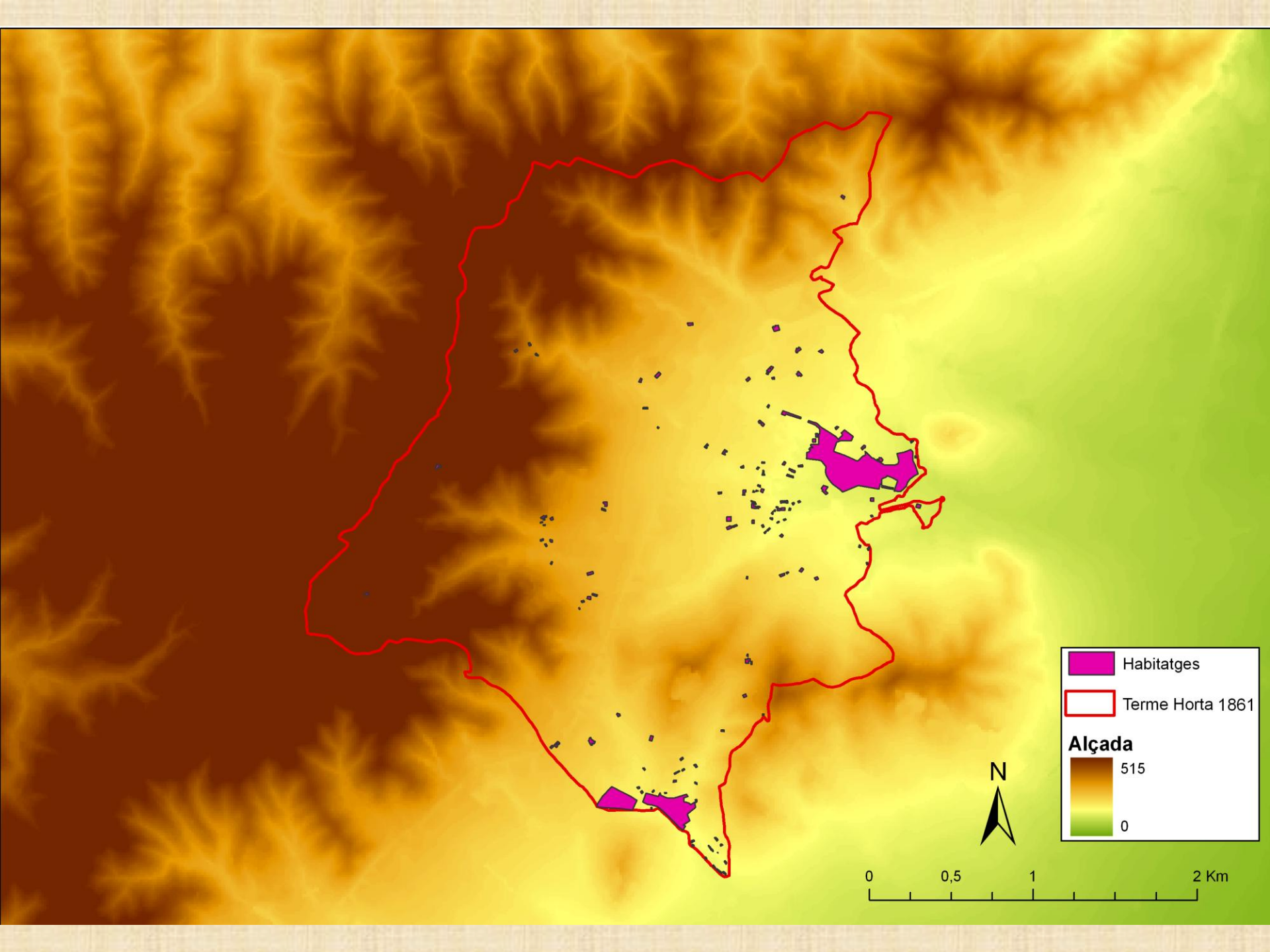
Process:

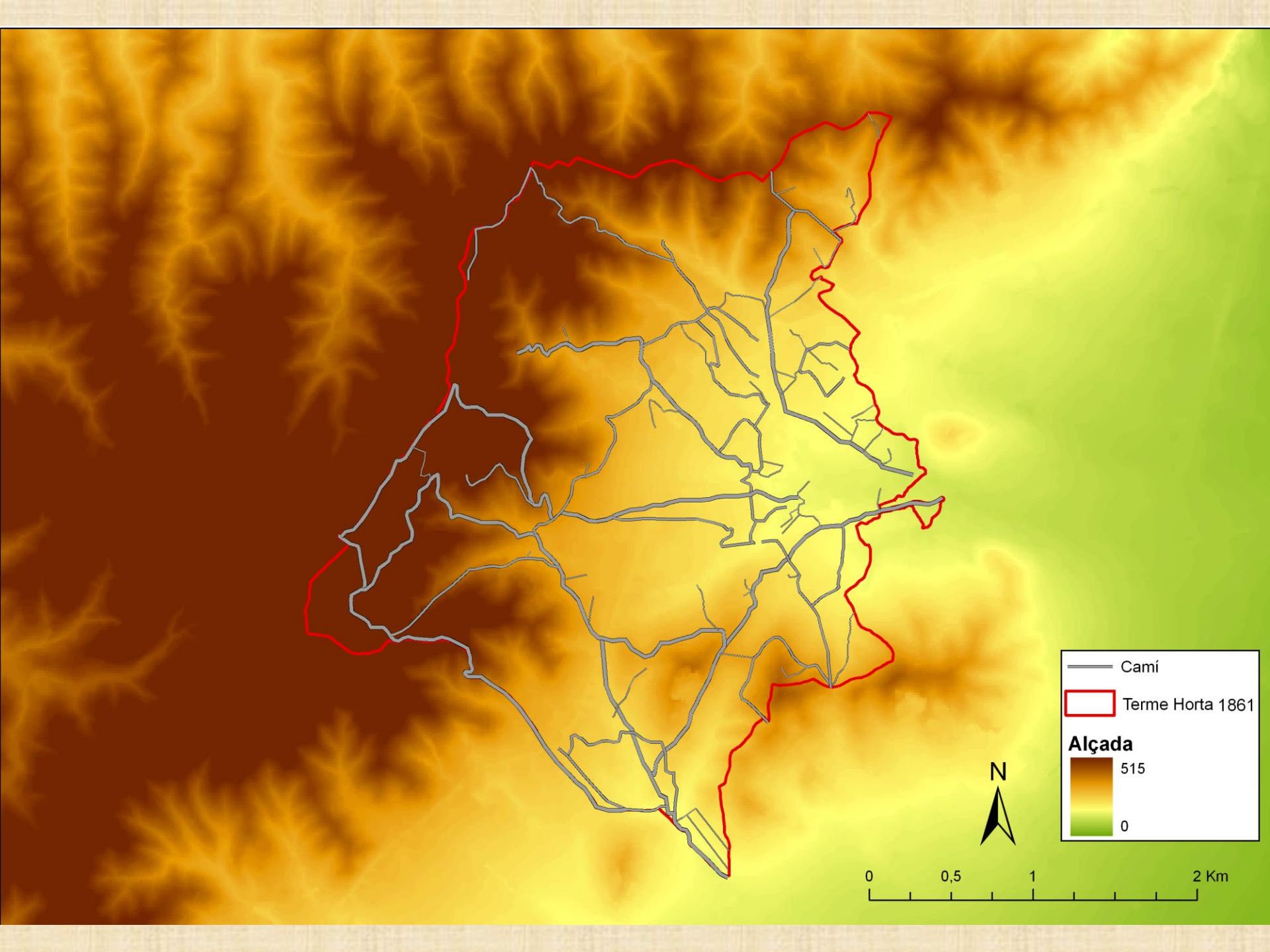
1. Clean the map
2. Georeference using the 1:5.000 ICC map
 - Country houses
 - Churches/Shrines
 - Street crossings
 - Top of mountains
3. Overlay within a GIS (**if map allows it!**)

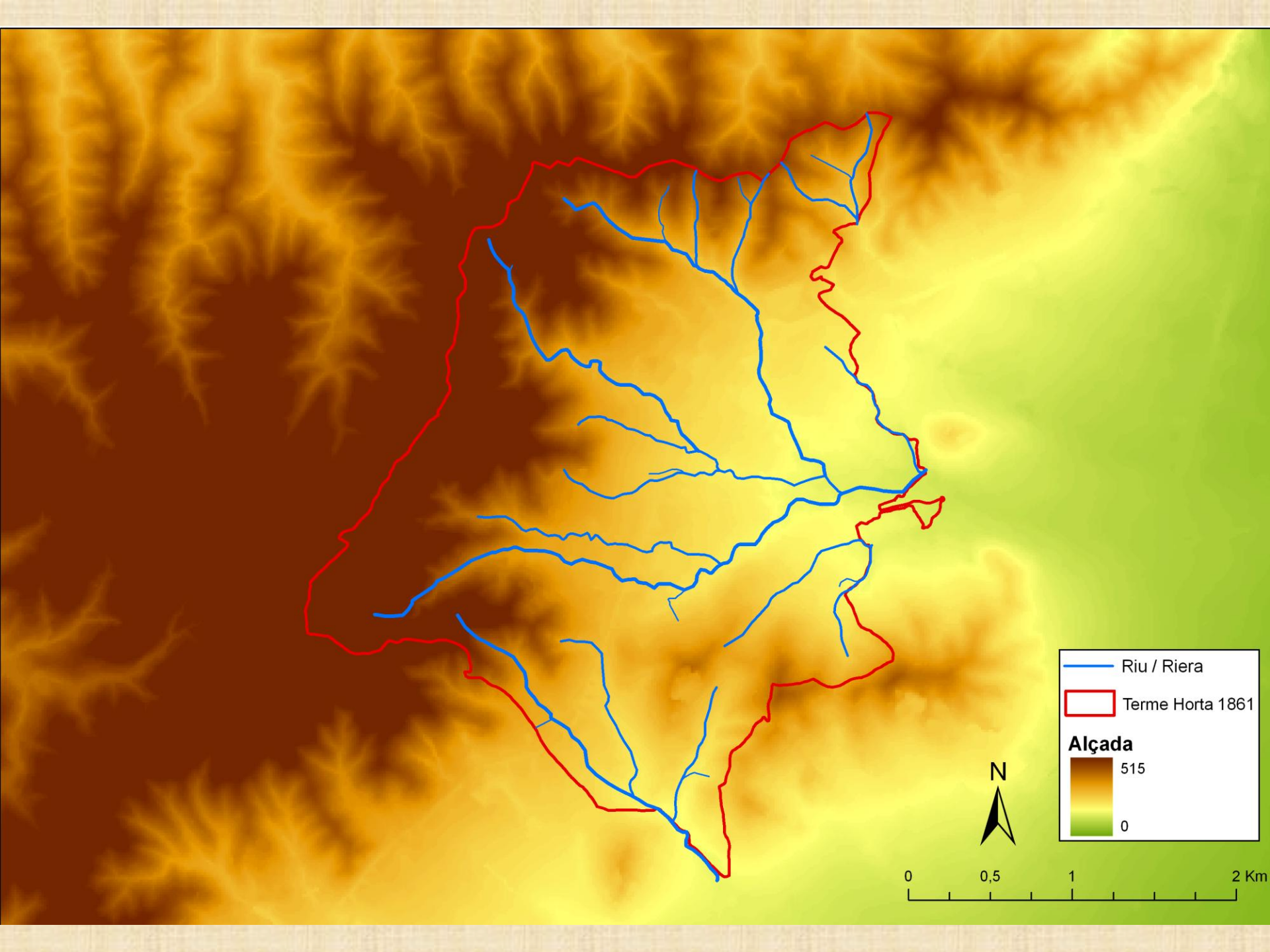


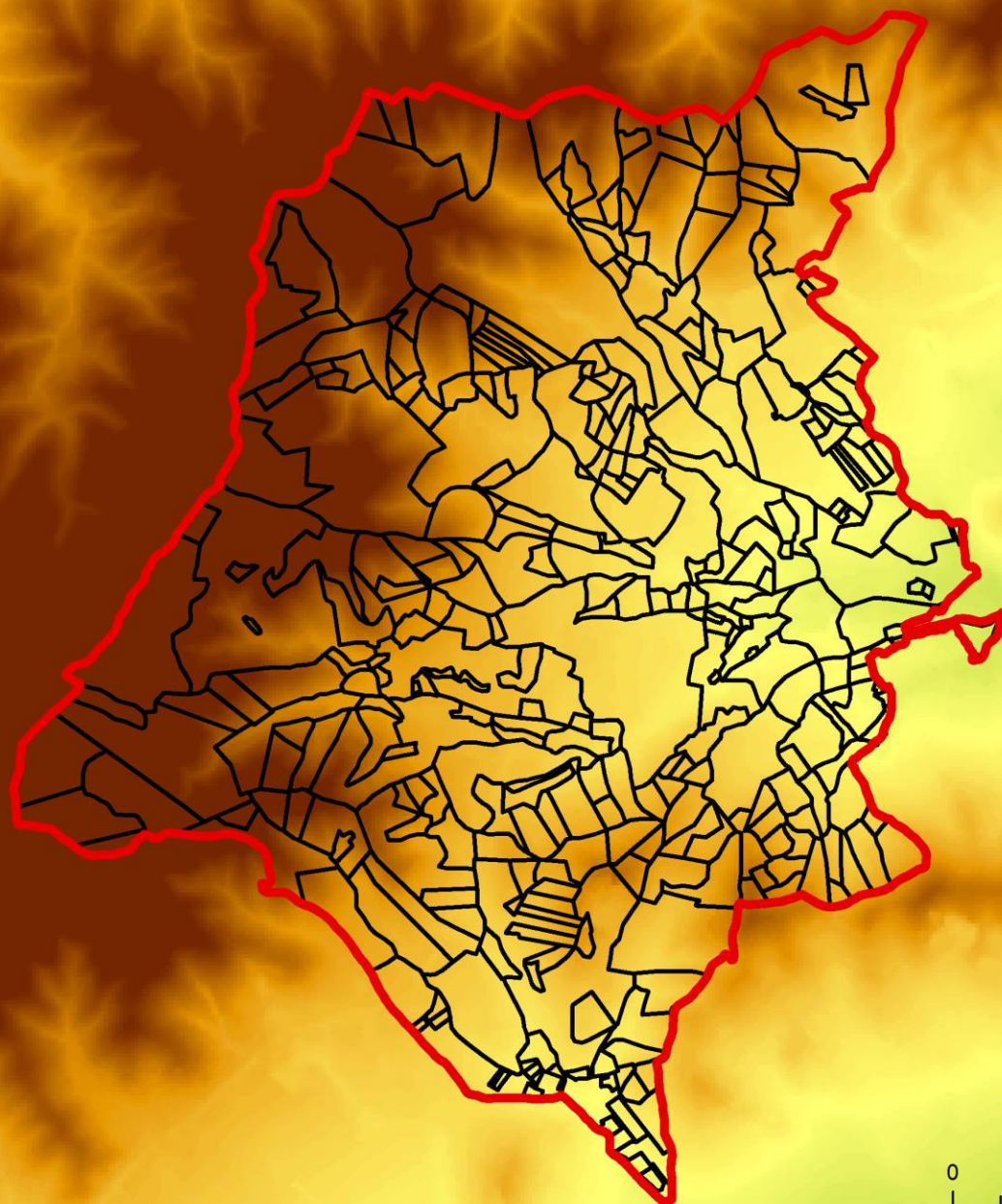
4. Digitise the map











Historical cartography and GIS

- The next step is to give attributes to the map
- *Amillaramiento* of the year 1862
- Information about each plot:
 - Name of owner
 - Surface
 - Type of crop
 - Quality of crop
 - Money produced
 - Tax paid

PARTE QUE CORRESPONDE

| AL PROPIETARIO | AL COLONO |
|----------------|----------------|
| Por la renta | Por el cultivo |
| Plas. Cts. | Plas. Cts. |

| Núm. de fincas. | Medidas. | Áreas. | Contineos. |
|-----------------|----------|--------|------------|
|-----------------|----------|--------|------------|

Año de 1881-82

NOMBRE
de los interesados y objeto de la imposición.

| Productos integrados. | Hajas por pastos naturales. | Líquido imponible. |
|--------------------------|-----------------------------------|-----------------------|
| Plas. Cts. | Plas. Cts. | Plas. Cts. |

PARTE QUE CORRESPONDE

| AL PROPIETARIO | AL COLONO |
|----------------|----------------|
| Por la renta | Por el cultivo |
| Plas. Cts. | Plas. Cts. |

1881-82

D. Manuel Zelaer por su esposa

Una suerte de tierra de 11¹/₂ áreas y 70 cent.¹ de 1^o en la Parilla adq^{ta} del al 1881.

| | | | | | | |
|-----|----|-----|----|----|----|---|
| 130 | 00 | 154 | 25 | 35 | 75 | B |
|-----|----|-----|----|----|----|---|

Otra de 85 ar¹ y 96 cent.¹ de 1^o en Pajares, adquirida del idem.

| | | | | | | |
|-----|----|-----|----|----|----|---|
| 145 | 00 | 117 | 25 | 22 | 75 | B |
|-----|----|-----|----|----|----|---|

Otra de 75 áreas 15 cent.¹ en los Lobo adquirida del idem.

| | | | | | | |
|-----|----|-----|----|----|----|------------------------|
| 120 | 00 | 102 | 25 | 24 | 25 | } Palas 2400 211.75 |
|-----|----|-----|----|----|----|------------------------|

Otra de 10 áreas y 75 cent.¹ con 15 rivas de 1^o del idem.

| | | | | | |
|----|----|----|----|----|----|
| 74 | 00 | 54 | 00 | 20 | 00 |
|----|----|----|----|----|----|

Otra de 1 hectárea 50 áreas 86 cent.¹ de 1^o en Barleños del idem.

| | | | | | |
|-----|----|-----|----|----|----|
| 331 | 50 | 303 | 50 | 73 | 00 |
|-----|----|-----|----|----|----|

Otra de 58, al 66 cent.¹ o sea 10 cent.¹ de 1^o en la Laguna del idem.

| | | | | | | |
|-----|----|-----|----|----|----|--|
| 136 | 25 | 110 | 00 | 28 | 25 | |
|-----|----|-----|----|----|----|--|

Otra de 1 hectárea 10 áreas y 70 cent.¹ en Barleños del idem.

| | | | | | | |
|-----|----|-----|----|----|----|--|
| 286 | 00 | 231 | 25 | 54 | 75 | |
|-----|----|-----|----|----|----|--|

Otra de 1 hectárea 10 áreas y 70 cent.¹ en la Laguna del idem.

| | | | | | | |
|-----|----|-----|----|----|----|--|
| 286 | 00 | 231 | 25 | 54 | 75 | |
|-----|----|-----|----|----|----|--|

Otra de 59 ar¹ y 9 cent.¹ en la Laguna del idem.

| | | | | | | |
|----|----|----|----|----|----|--|
| 29 | 00 | 29 | 25 | 19 | 25 | |
|----|----|----|----|----|----|--|

Otra de Olivar con 10 fies en la Rivera adq^{ta} del idem.

| | | | | | | |
|-----|----|-----|----|----|----|---|
| 217 | 75 | 136 | 75 | 31 | 00 | B |
|-----|----|-----|----|----|----|---|

Otra con 200 ar¹ y 2 cent.¹ de 1^o en el monte y el chorrito o Parilla del idem.

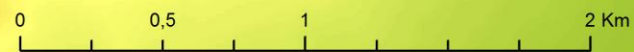
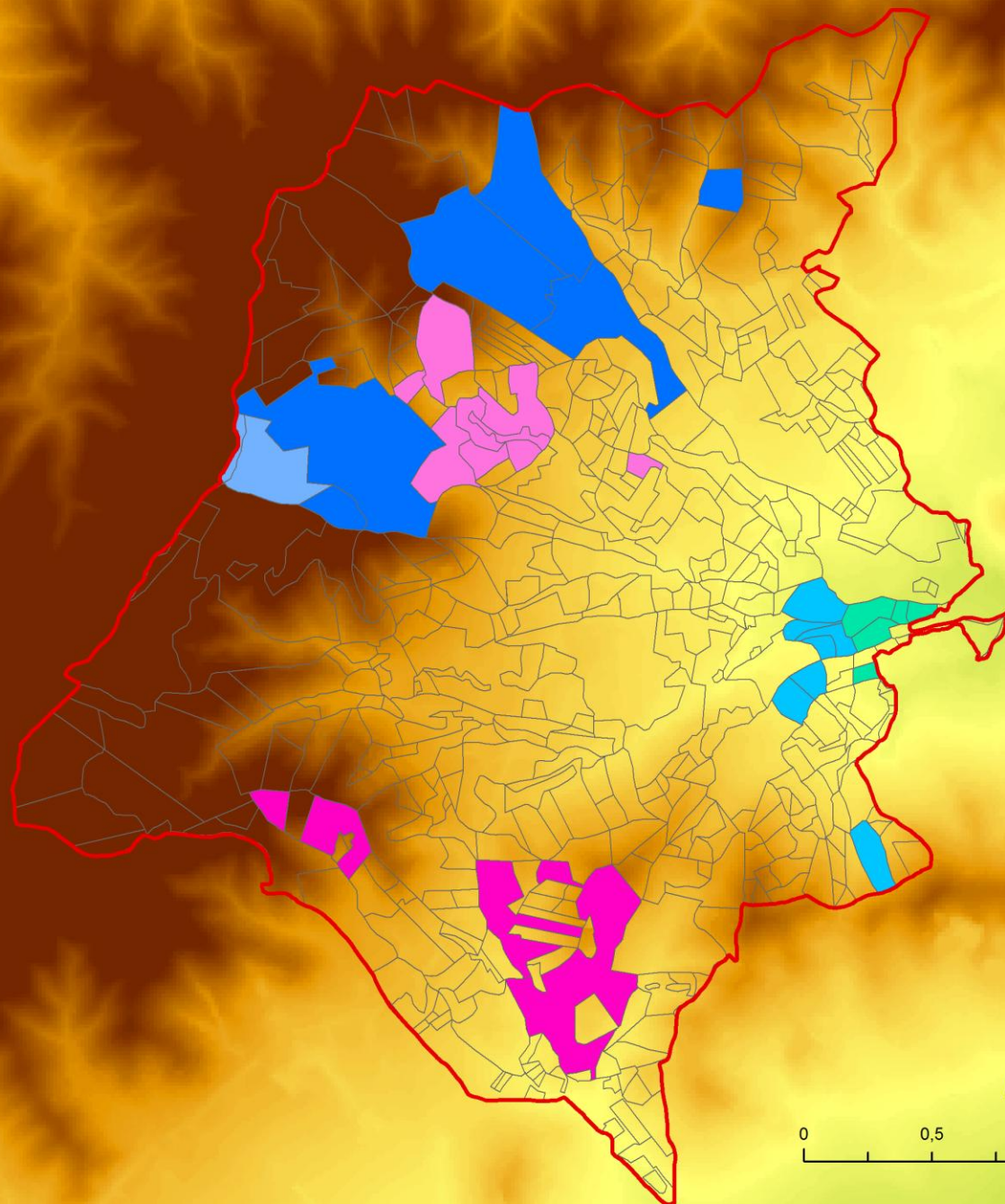
| | | | | | | |
|-----|----|-----|----|----|----|---|
| 248 | 50 | 151 | 50 | 67 | 00 | B |
|-----|----|-----|----|----|----|---|

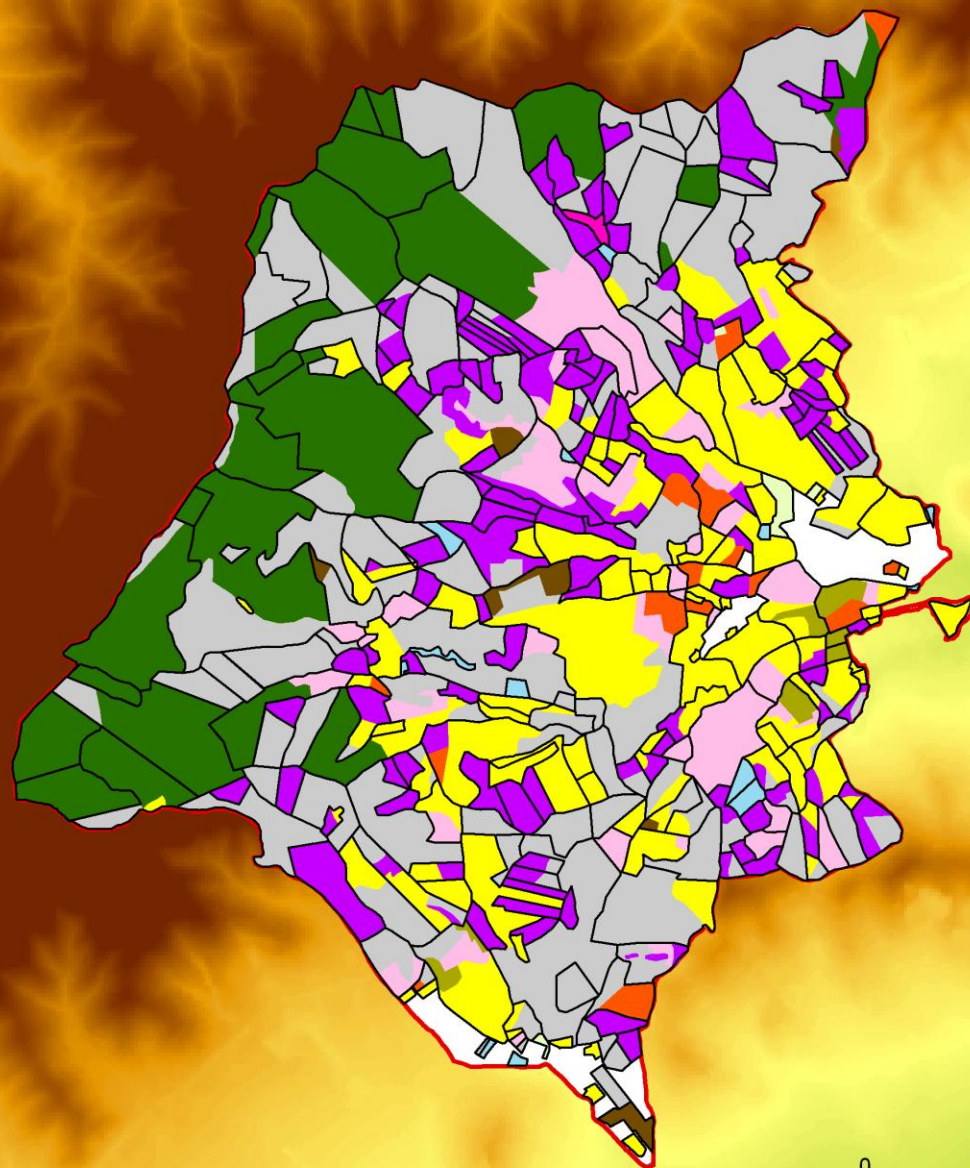
| | | | | | | |
|------|----|------|----|-----|----|------------|
| 2161 | 00 | 1677 | 25 | 653 | 75 | Imposición |
|------|----|------|----|-----|----|------------|

Año de 1882-83

Se le amillara el cultivo de maiz en Montijo del al 89.

17.00
B





Ús del sòl

- Algarrobos
- Bosque
- Cereales
- Frutales
- Jardin
- Multicultivo
- No consta
- Olivar
- Urbana
- Viña
- Yermo

No agrícola

Limits parcel·laris

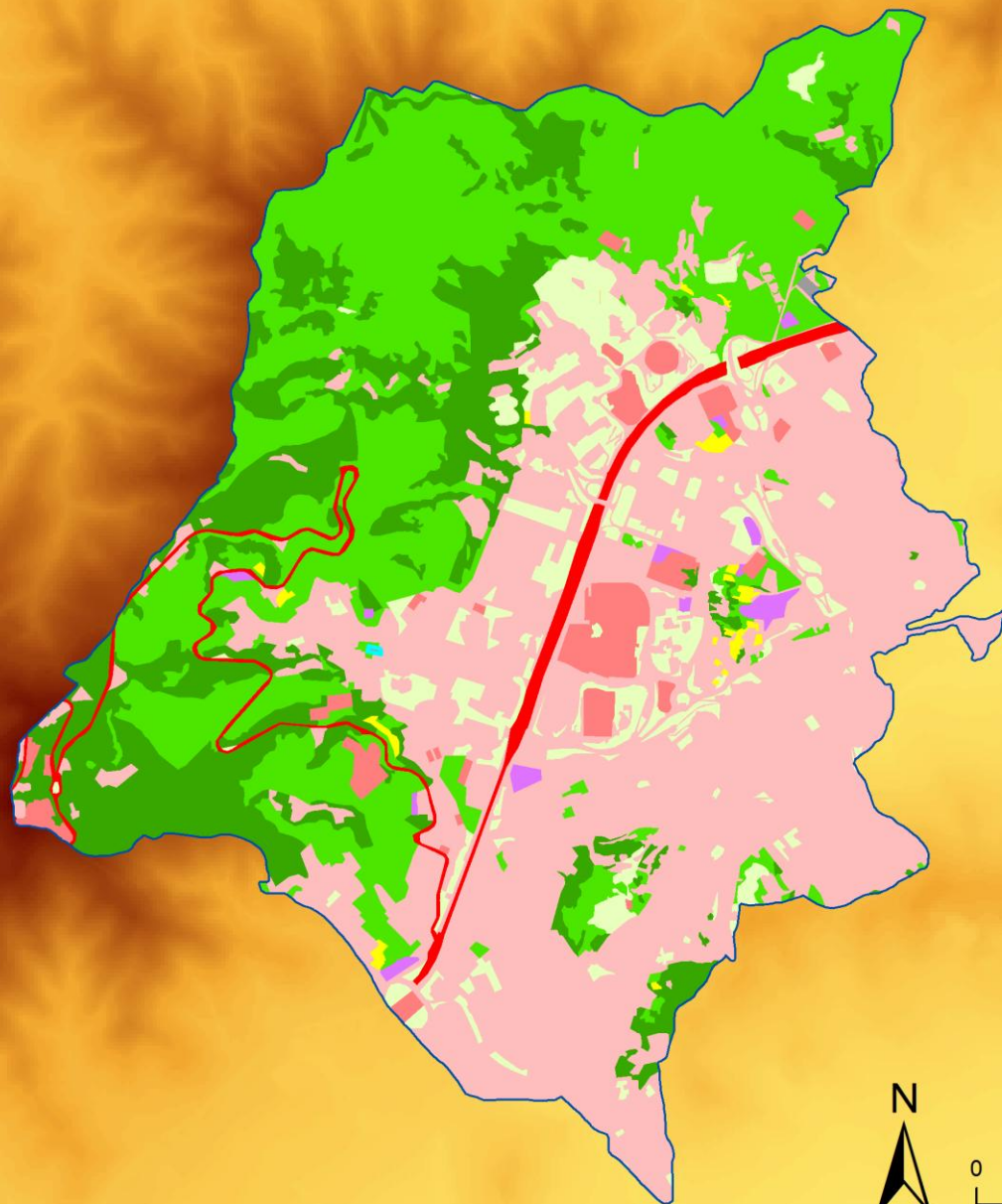
Terme Horta 1861

Alçada

- 515
- 0



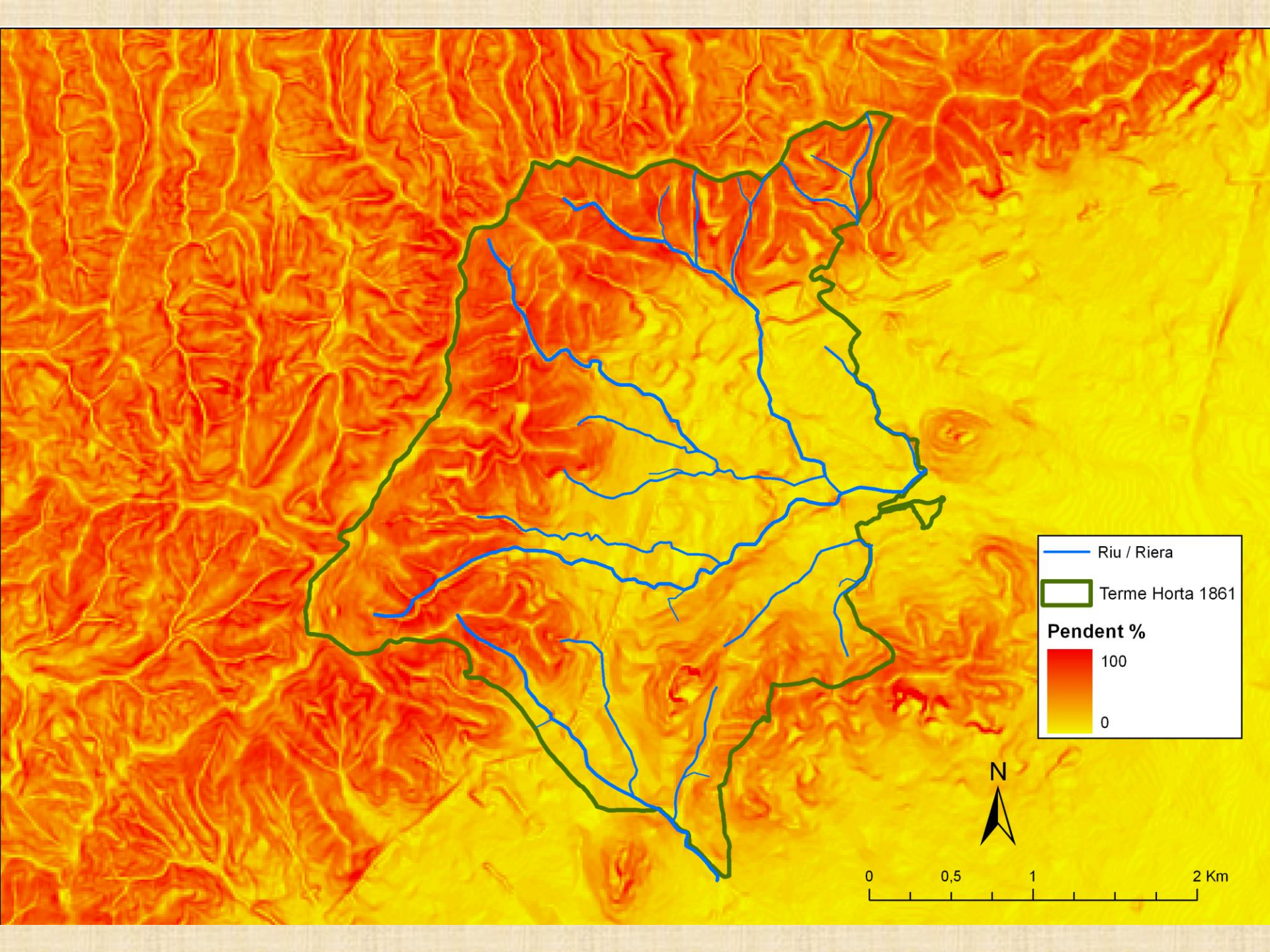
0 0,5 1 2 Km

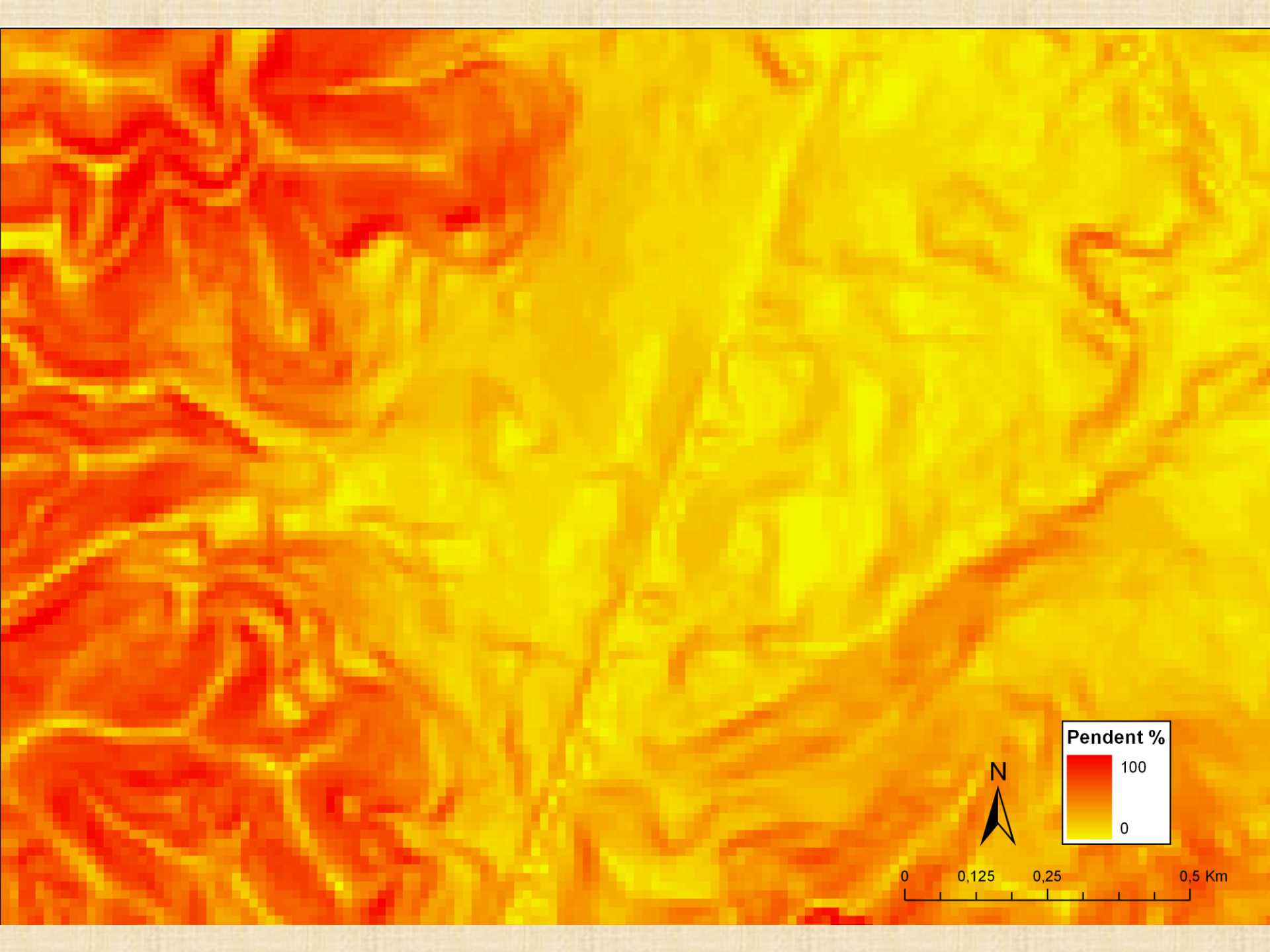


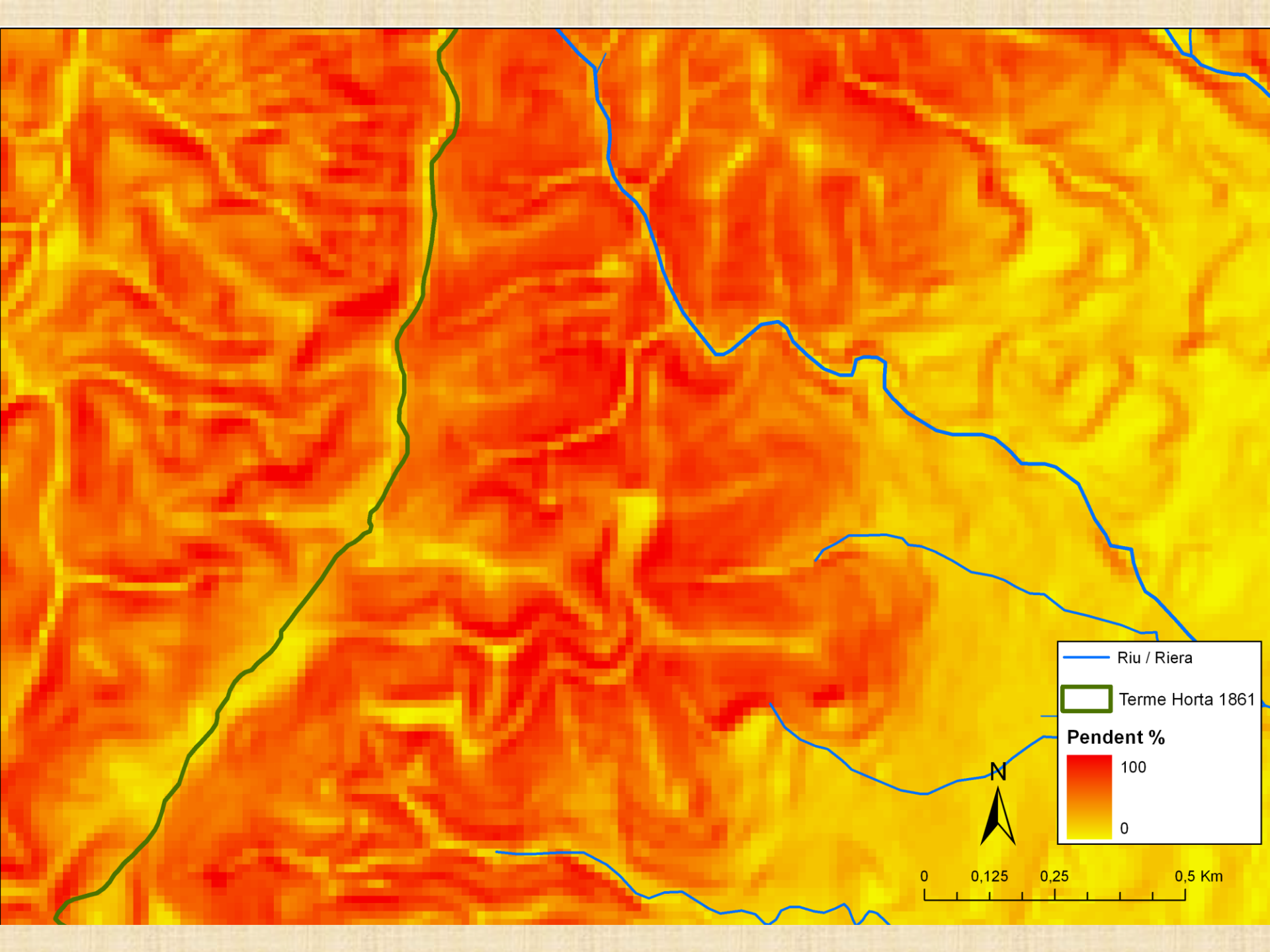
DEM Integration

DEM Integration

- DEM created by the Catalan Cartographical Institute with a resolution of 15m x 15m
- DEMs allow creating new information (slope, aspect, viewshed...)
- It allows overlaying information to create a 3D view
- Furthermore, it allows checking the geometrical and topographical consistency of the historic map





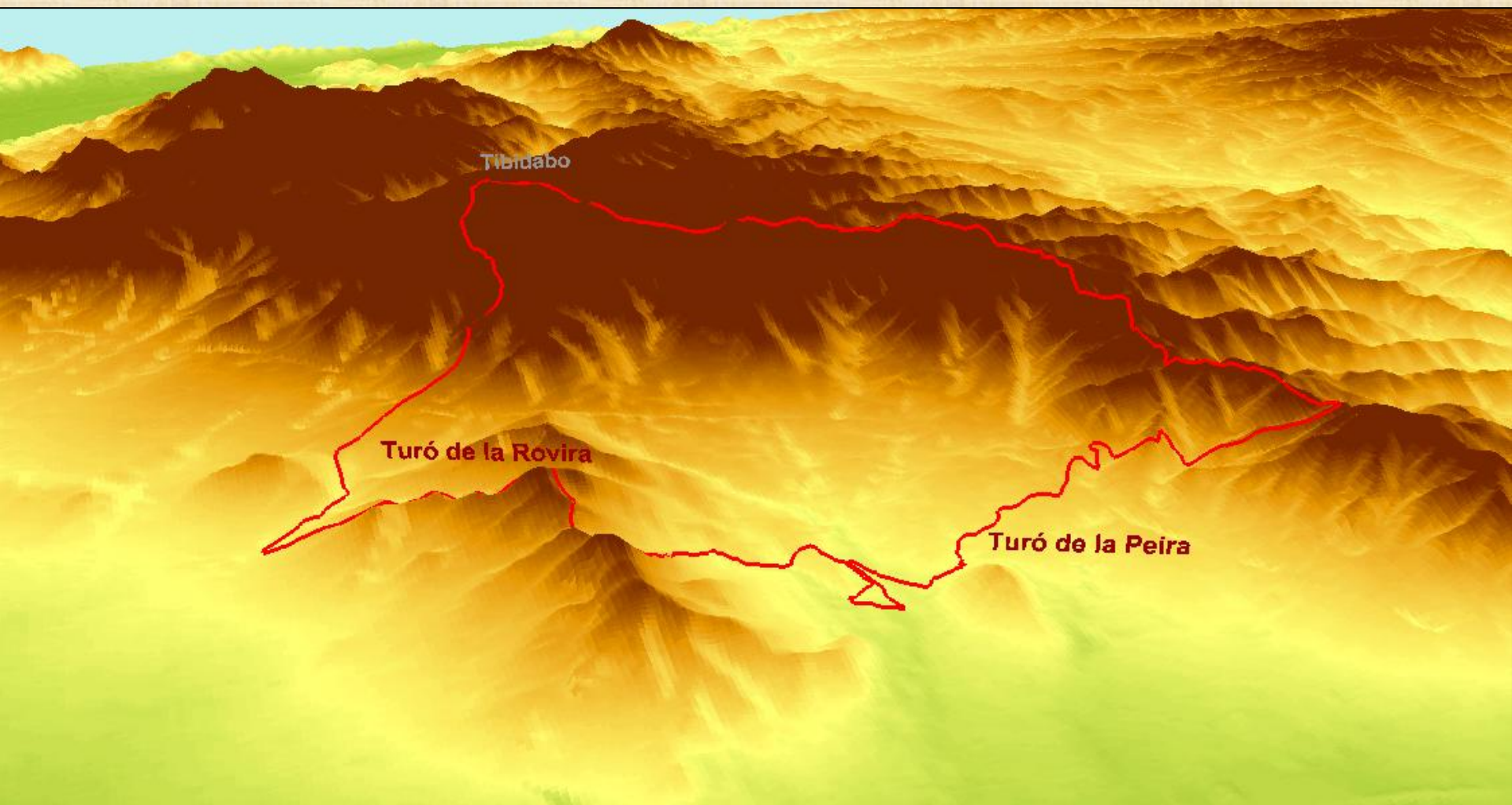


DEM Integration

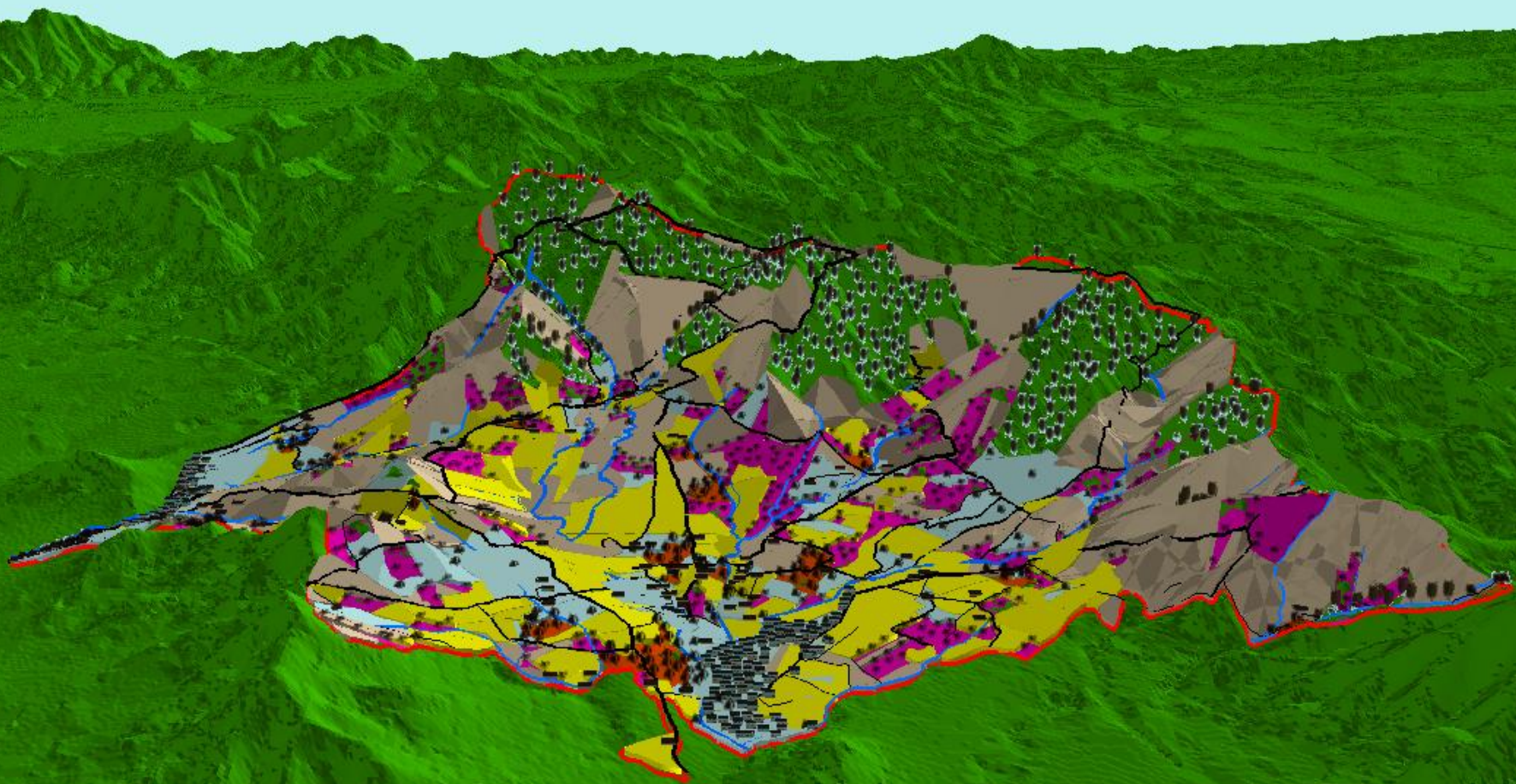
- Integrating historical maps with a DEM allows to:
 - Display data in 3D
 - Recreate past landscapes
 - Analyse the influence of orography in the past
 - Explore the altitudinal distribution of crops
 - Distribute the results on-line with the aid of a distributed DEM system

Results

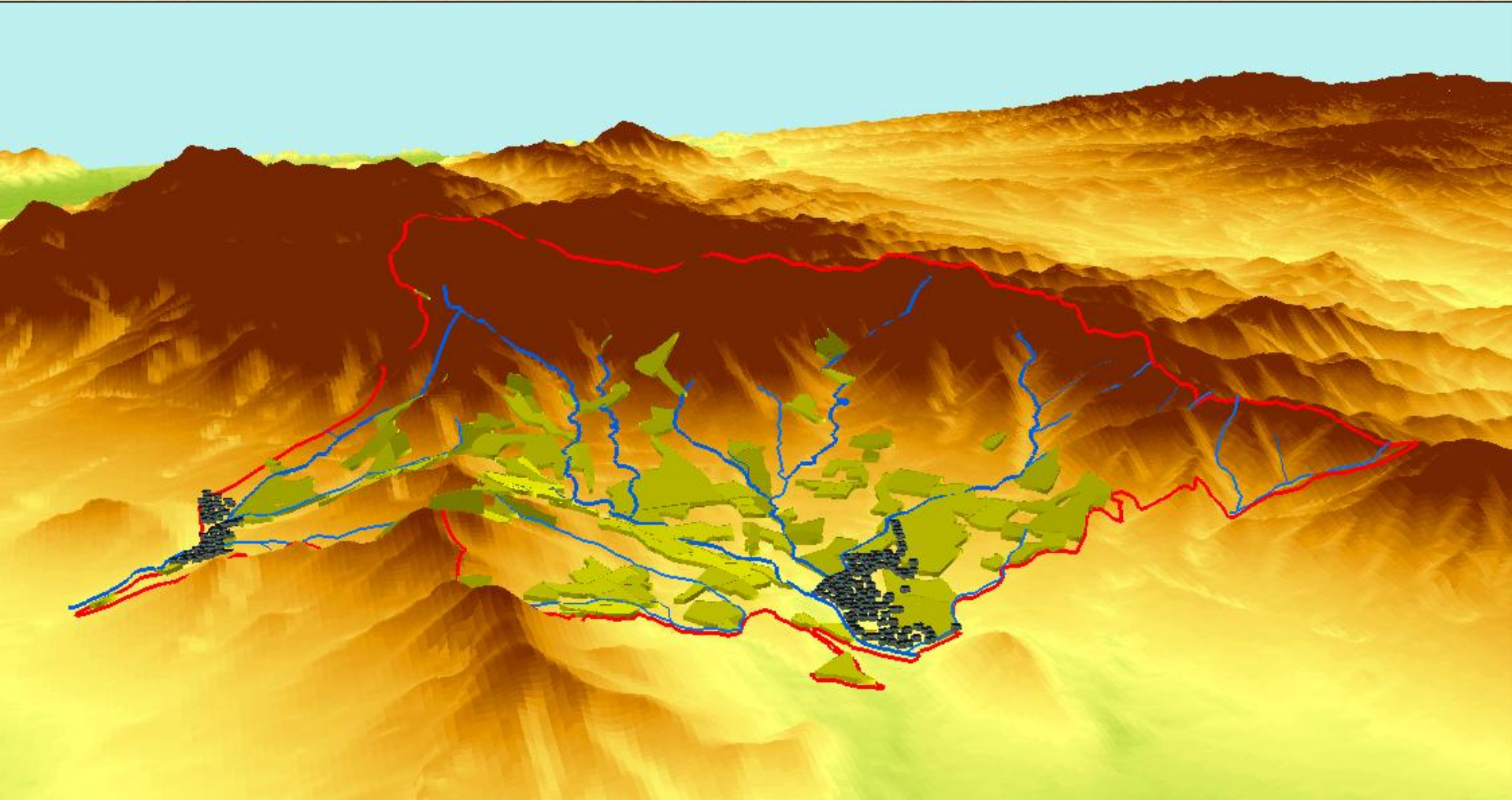
Horta 1861



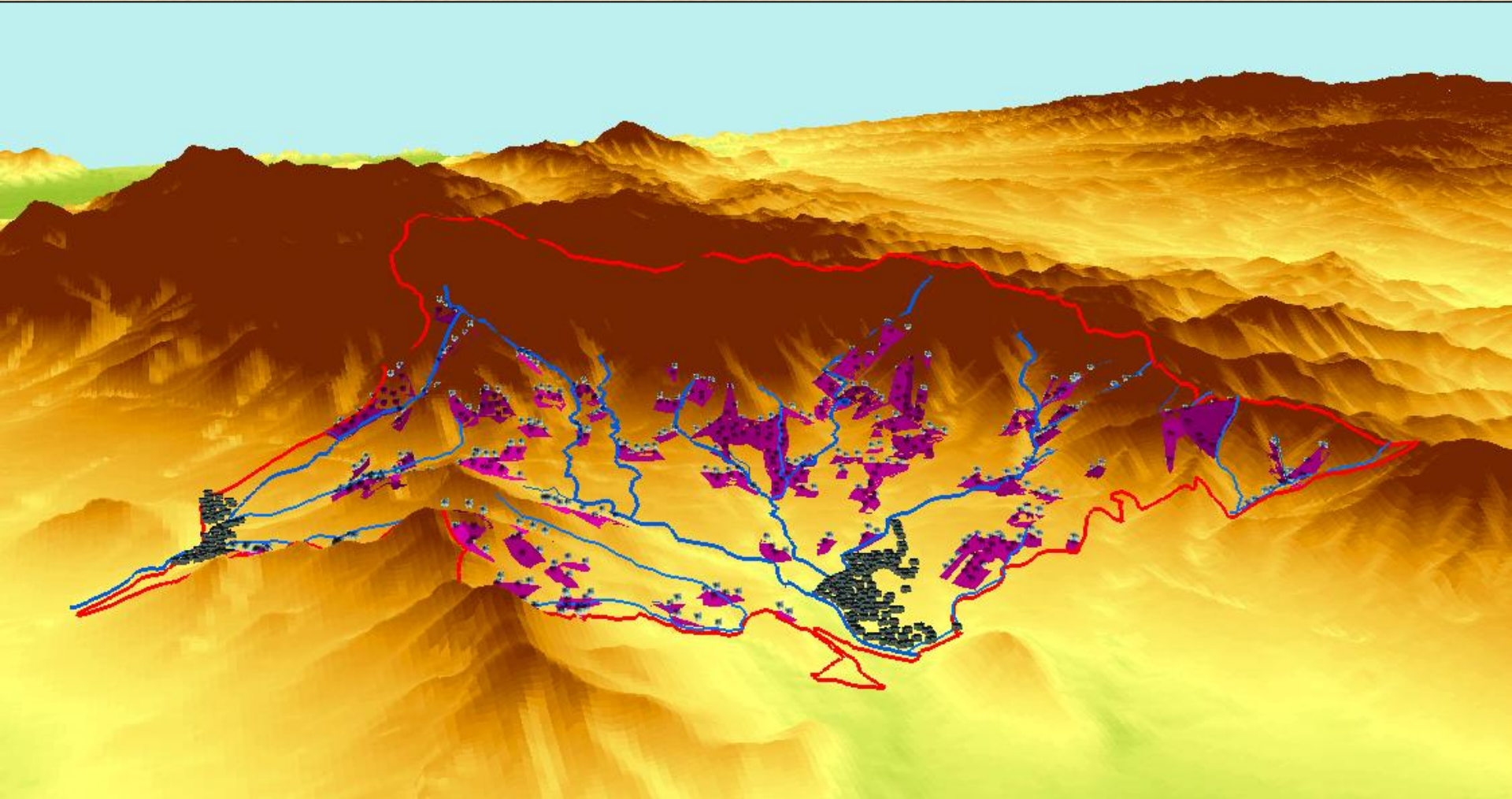
Results: Land Use



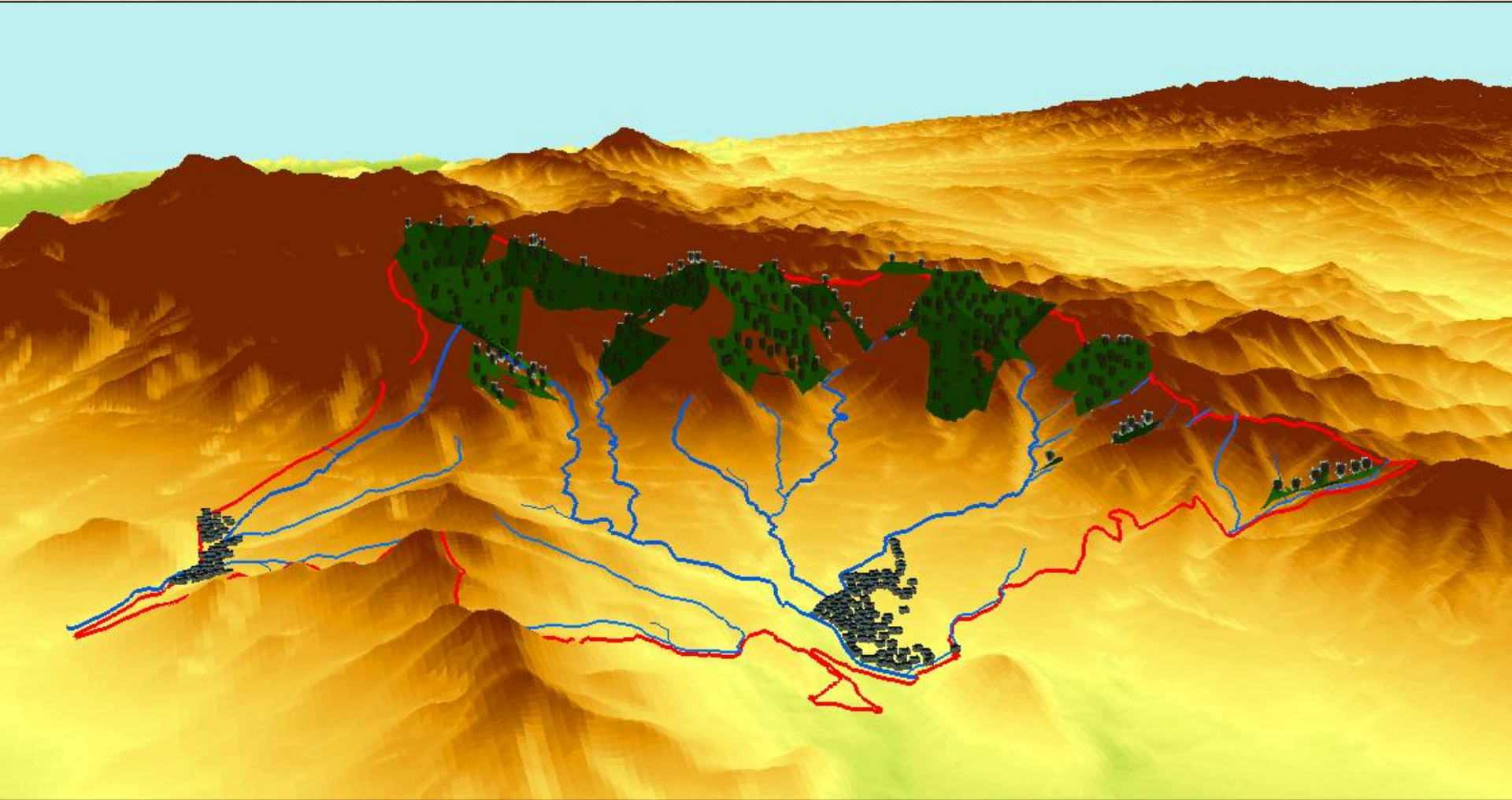
Cereals



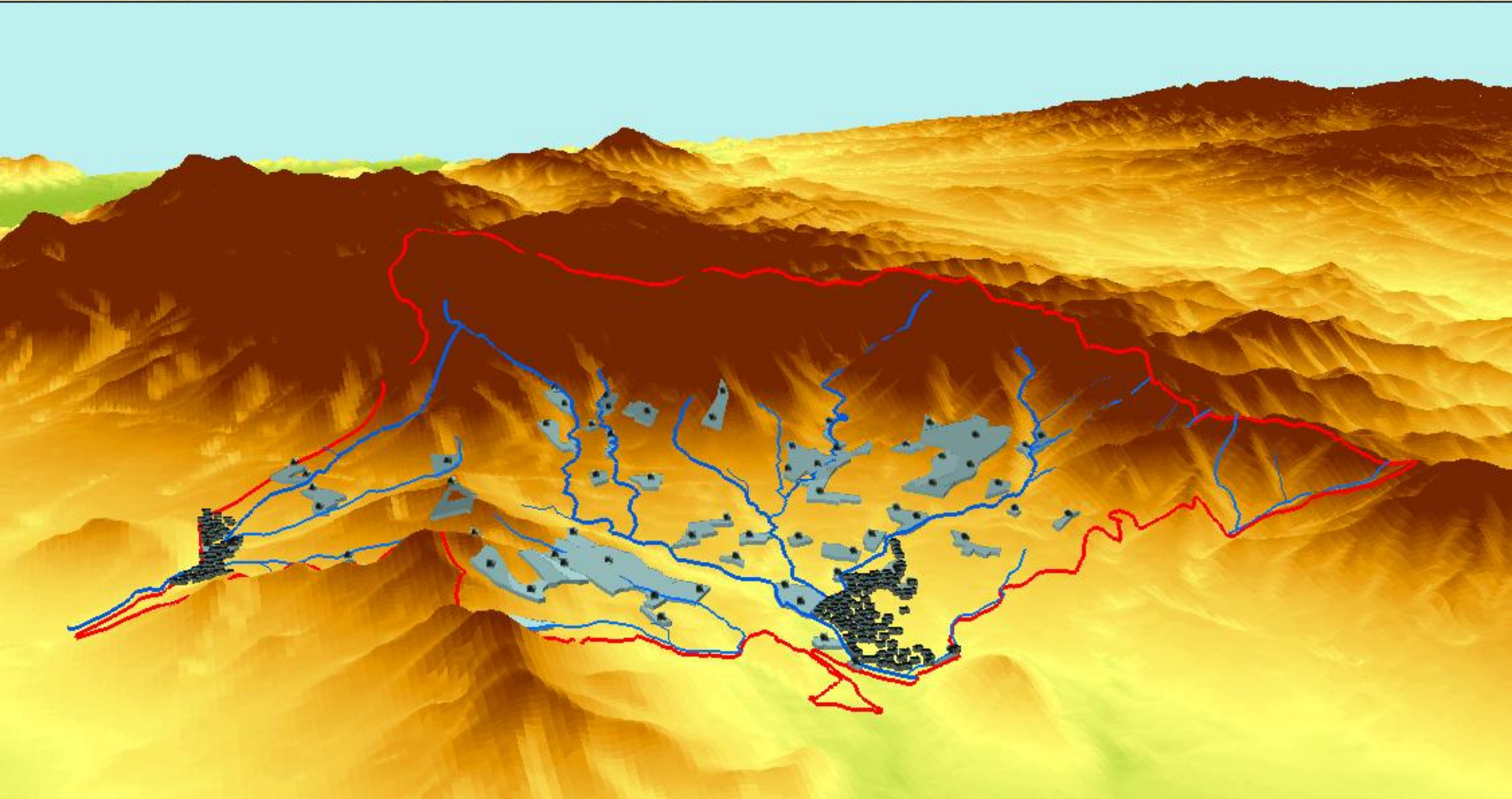
Viticulture



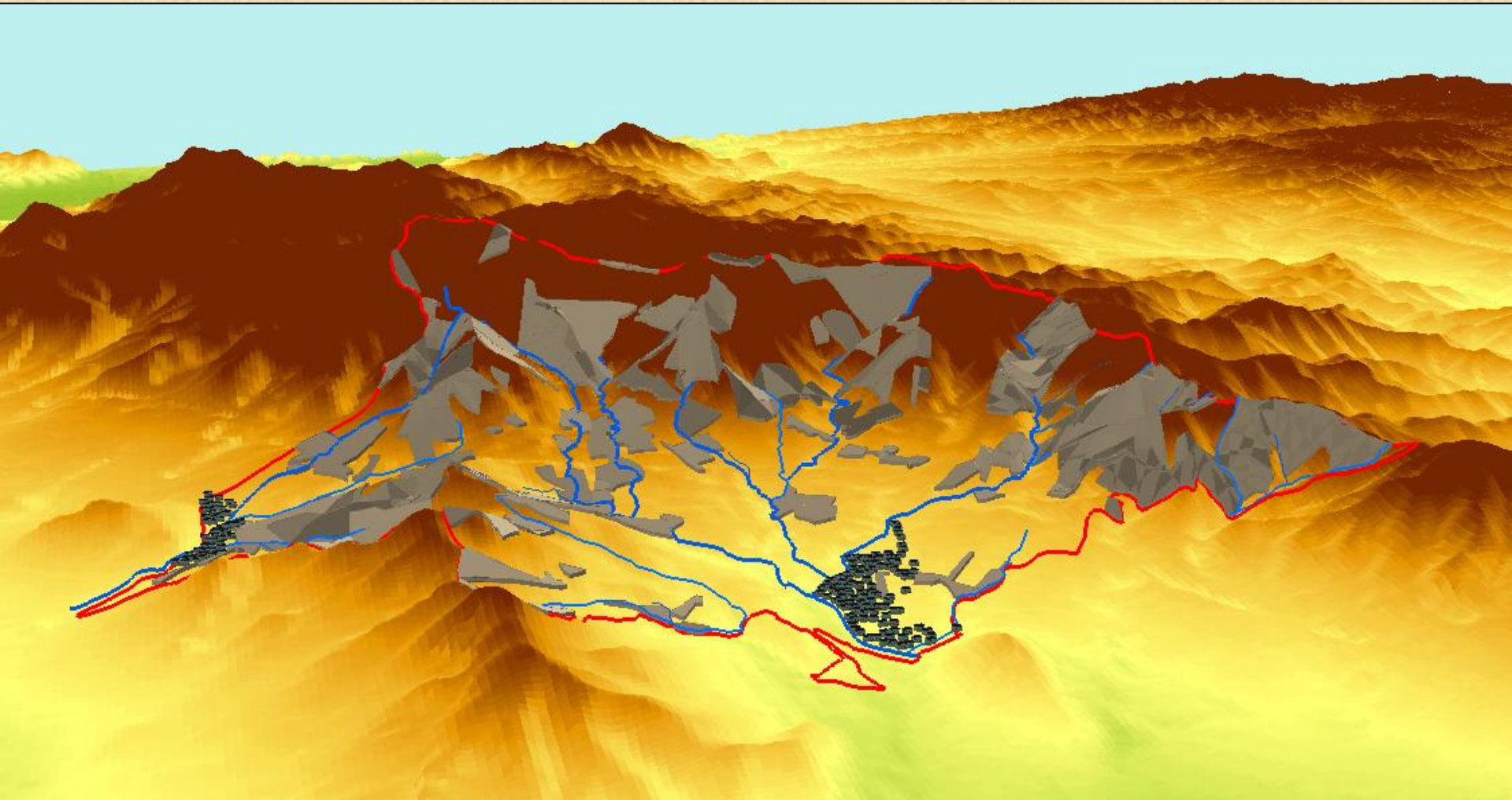
Forest



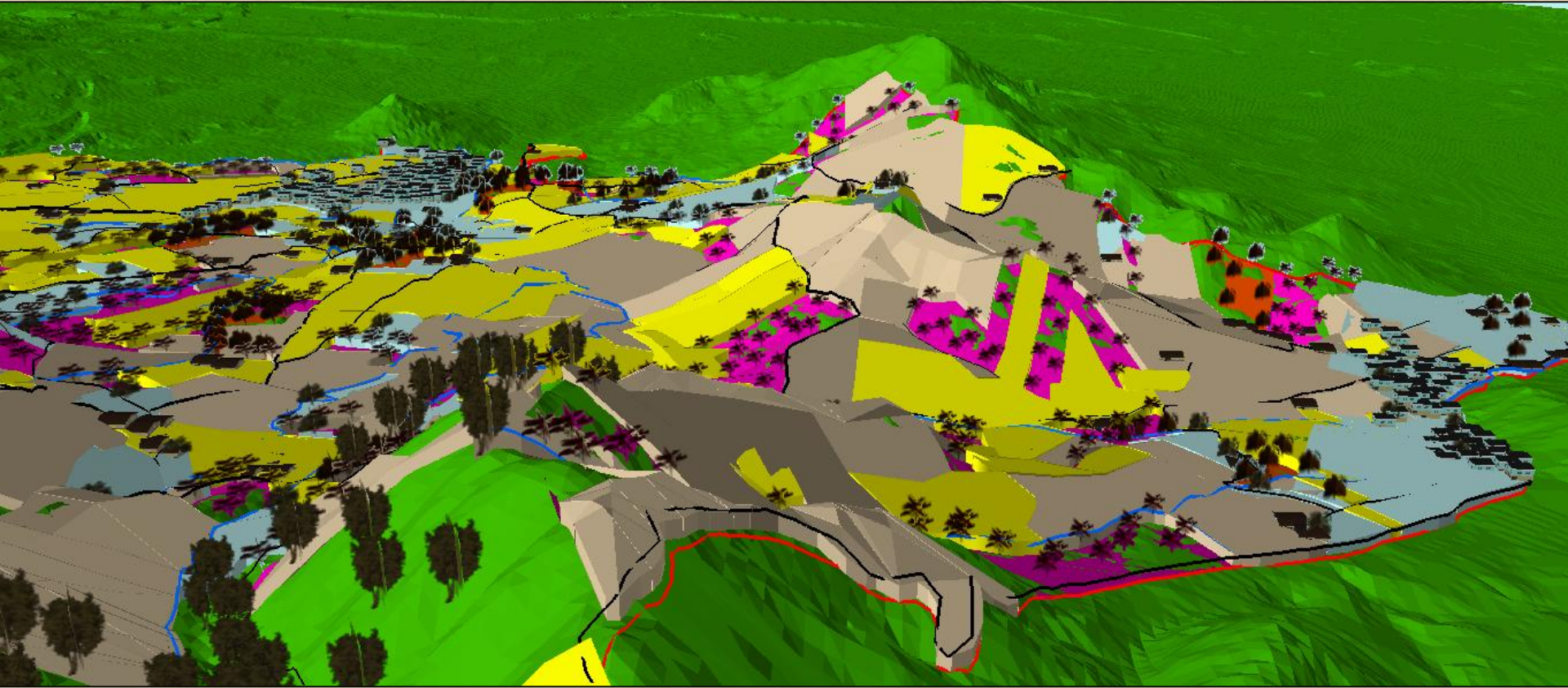
Orchards



Uncultivated



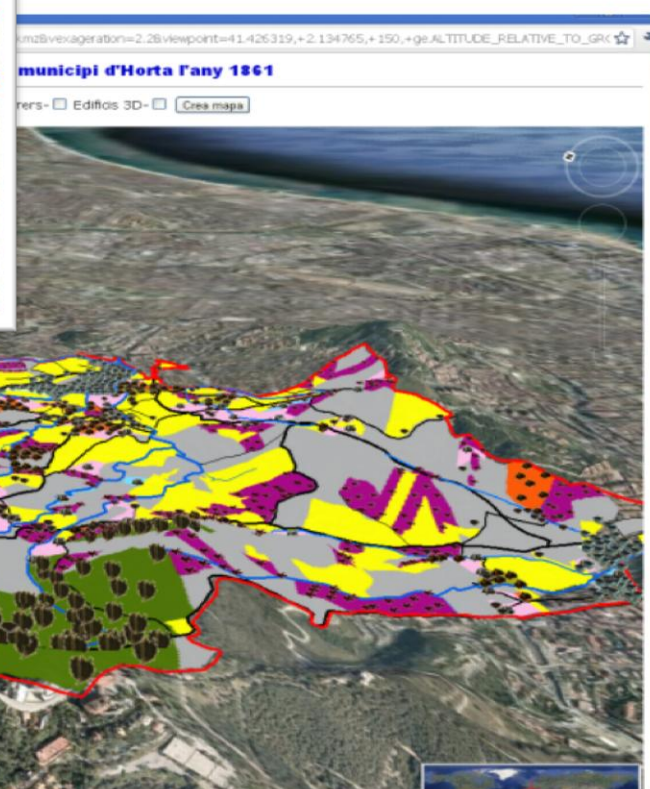
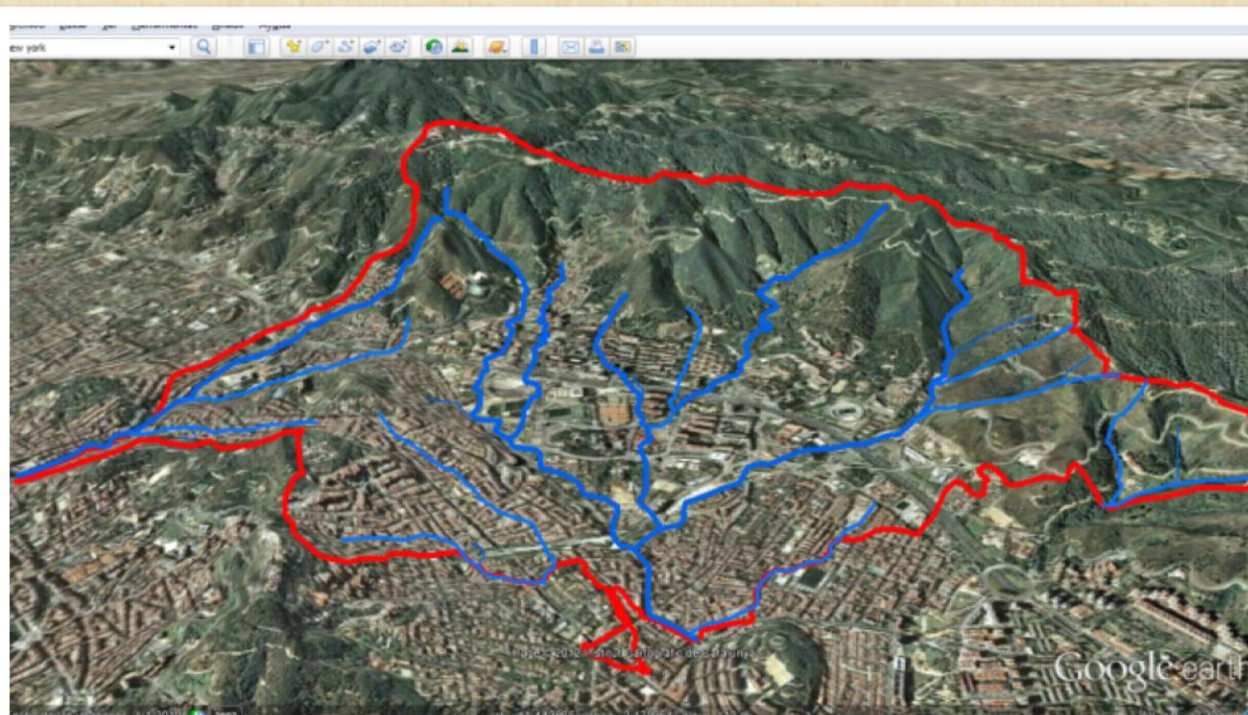
View from the mountain



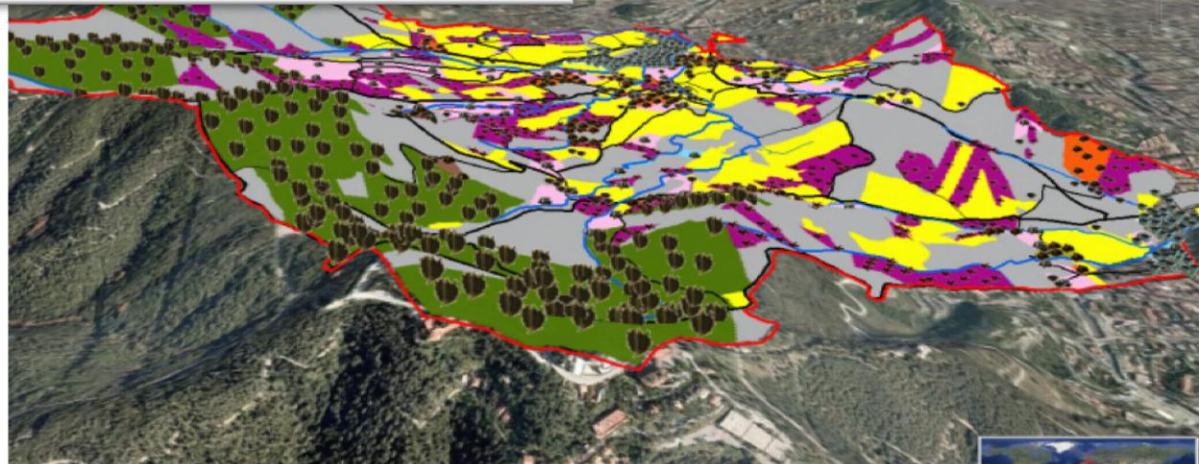
View from the town



Distribution of results on-line



<http://www.gisngeo.com/gmaps/gearth/horta/gearth.php>



Conclusions

- The integration between Catalan historical cadastral maps and GIS is possible thanks to their high geometrical quality
- Manually integrating those maps is very time consuming, an automatic process should be sought
- DEM + historical cartography allows to improve the visualisation and analysis possibilities

Conclusions

- Distributing historical data digitally makes it available to the general public
- Interactivity and overlays allow obtaining new information from old maps
- Next steps:
 - Improve levels of interactivity (games engine)
 - Tackle urban areas
 - Work on automating processes

Thank you for your attention

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