

Razvoj Land use sloja i Land cover metodologije u RH za 2020 godinu te povijesnog niza – prikaz rezultata

Nino Malešić, Sara Baćeković, Marina Kukavica, EKONERG

Zadar 27 / 03 / 2025



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AGENCIJA ZA
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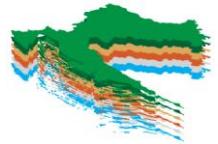


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FOND ZA ŠTITU OKOLIŠA I
ENERGETSKU UČINKOVITOST





Razvoj Land use (LU) sloja za 2020. godinu

Nino Malešić, Ekonerg



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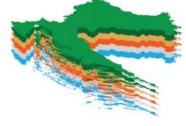


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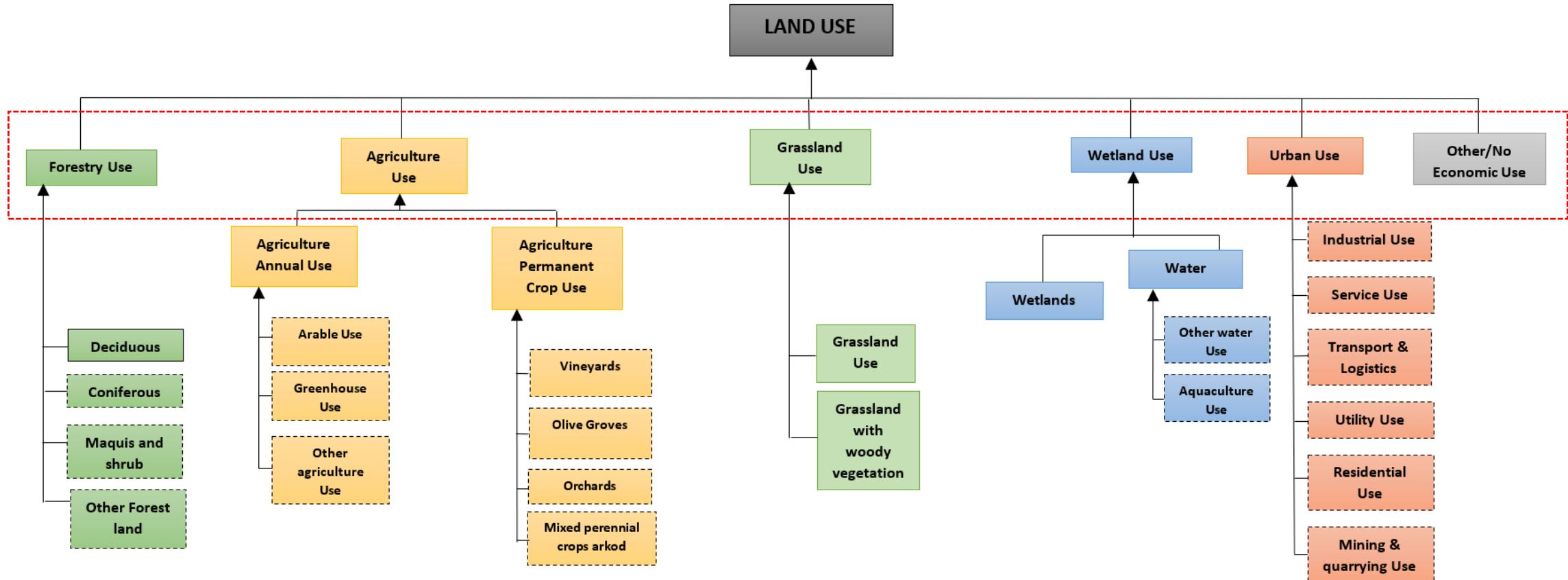
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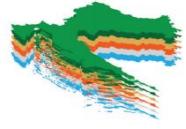




LU Konceptualni model

L1

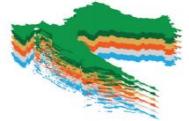




Metodologija izrade CROLIS LU sloja - Faze

1. Prikupljanje **nacionalnih LU podataka** od ovlaštenih institucija po klasama
2. Rasterizacija vektorskih podataka (vector - > raster)
3. Spajanje pojedinačnih rastera u **jedan raster za cijelu Hrvatsku**
 - Po prioritetima klasa





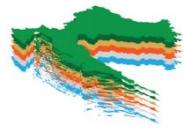
Metodologija izrade CROLIS LU sloja - Prioritetnost

3. Spajanje pojedinačnih rastera u **jedan raster za cijelu Hrvatsku**

- Po prioritetima klasa, 23 L2 klasa slojeva

4. Popunjavanje praznina – 23. klasa (Grassland with woody features)

| Prioritet | Klasa (Level 2) |
|-----------|---------------------------------|
| 1 | Residential Use |
| 2 | Industrial Use |
| 3 | Service Use |
| 4 | Transport & Logistics Use |
| 5 | Utilities Use |
| 6 | Mining and quarrying Use |
| 7 | Deciduous forest |
| 8 | Coniferous forest |
| 9 | Maquis and shrub |
| 10 | Other Forest land |
| 11 | Arable Use |
| 12 | Grassland Use |
| 13 | Orchards |
| 14 | Vineyards |
| 15 | Olive groves |
| 16 | Mixed perennial crops |
| 17 | Greenhouse Use |
| 18 | Other agriculture Use |
| 19 | Wetland Use |
| 20 | Aquaculture use |
| 21 | Other water Use |
| 22 | Other/no economic Use |
| 23 | Grassland with woody vegetation |

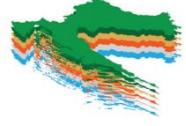


Faza 1: Prikupljanje nacionalnih LU podataka po klasama L1 klasa Forestry use



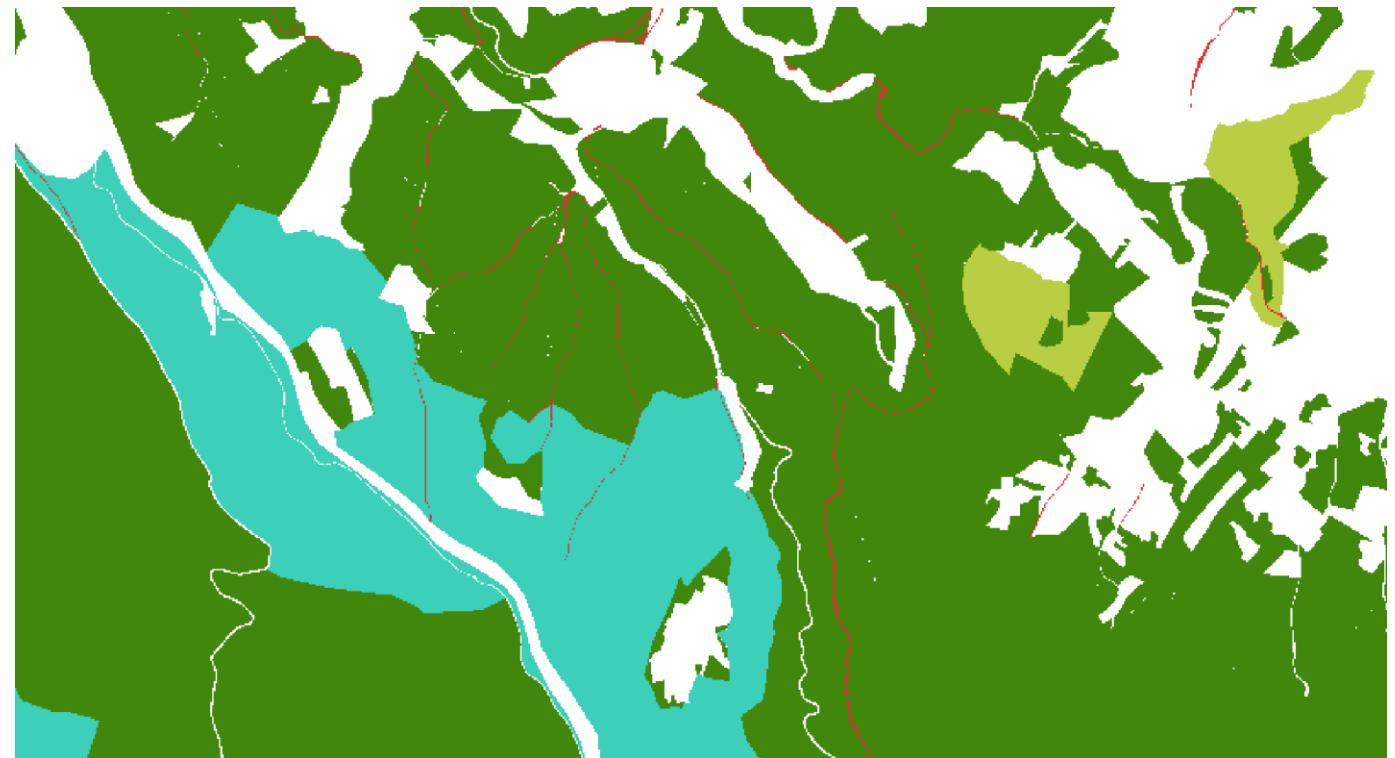
Ažurirani sloj HŠ – **trenutna verzija**

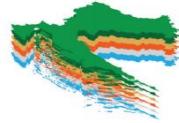
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Forestry use - potkategorije

- Iz baze Hrvatskih šuma reklassificirane klase u 4 potkategorije





Faza 1 Prikupljanje nacionalnih LU podataka po klasama L2 klasa Permanent crop Use

- izvor 1) ARKOD baza: atributi Voćnjak, Vinograd, Maslinik, Višegodišnji trajni nasadi
- izvor 2) Min. poljoprivrede: atribut Voćnjak, Vinograd, Maslinik

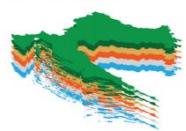


Izvor 1: ARKOD



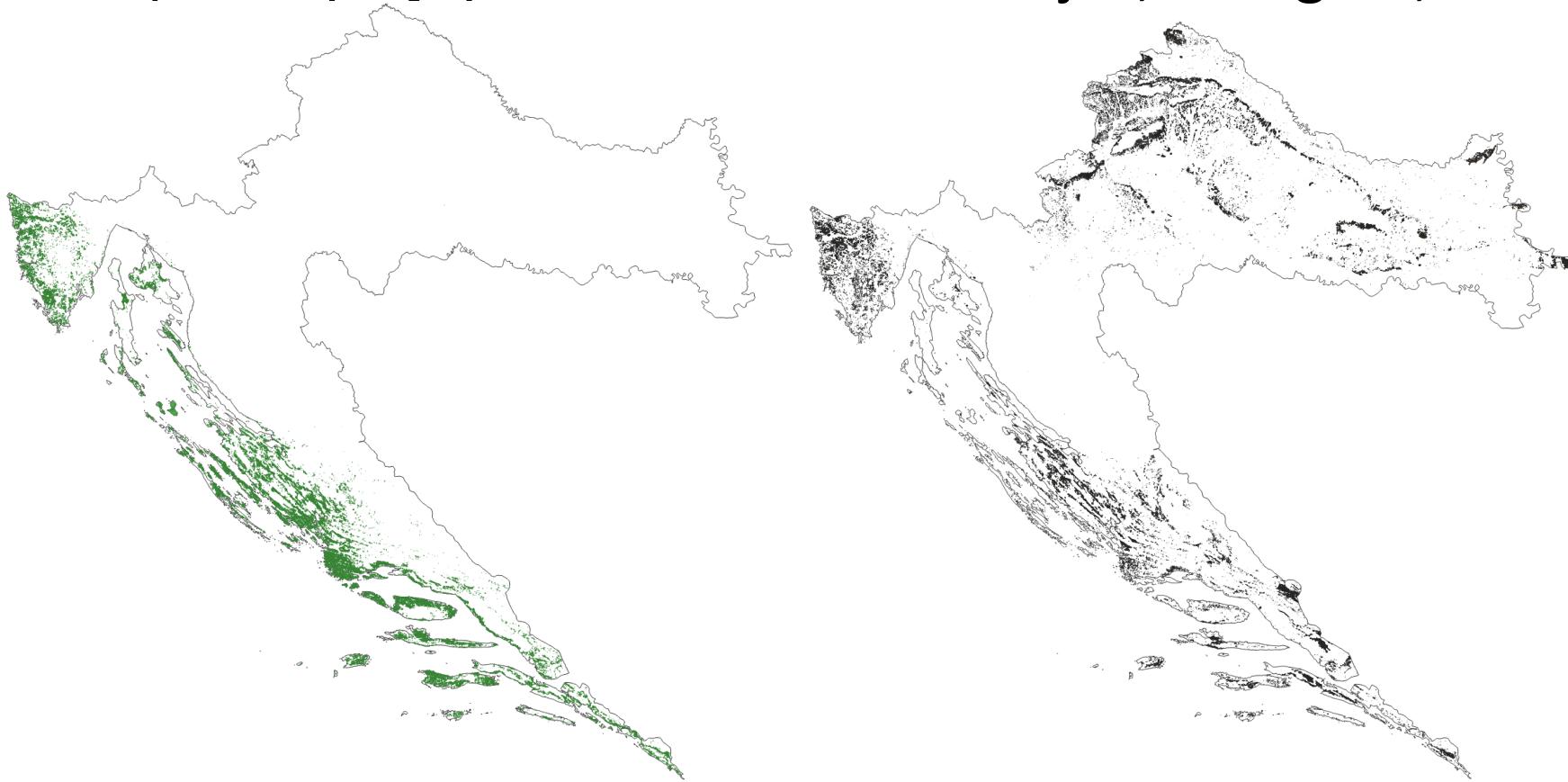
Izvor 2: Min. poljoprivrede

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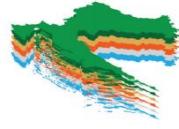


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Faza 1 Prikupljanje nacionalnih LU podataka po klasama L1 klasa Grassland use

- izvor 1) ARKOD baza: atributi Livada, Pašnjak, Krški pašnjak
- izvor 2) Min. poljoprivrede: atributi Livada, Pašnjak, Nekorišteno



Izvor 1: ARKOD



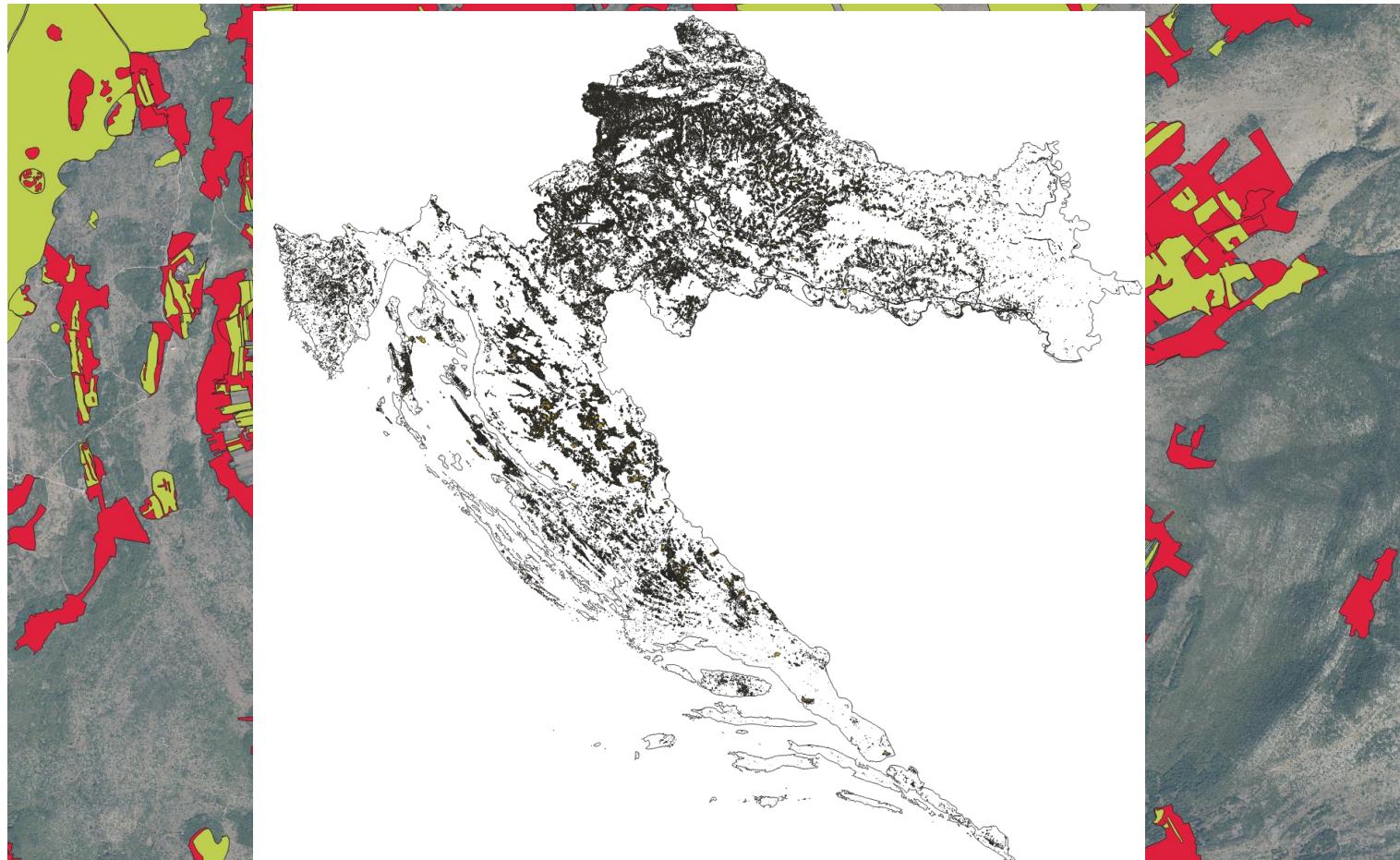
Izvor 2: Min. poljoprivrede

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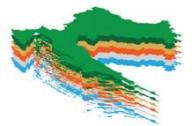
Faza 1 Prikupljanje nacionalnih LU podataka po klasama

L1 klasa Grassland use

- izvor 1) ARKOD baza: atributi Livada, Pašnjak, Krški pašnjak
- izvor 2) Min. poljoprivrede: atributi Livada, Pašnjak, Nekorišteno



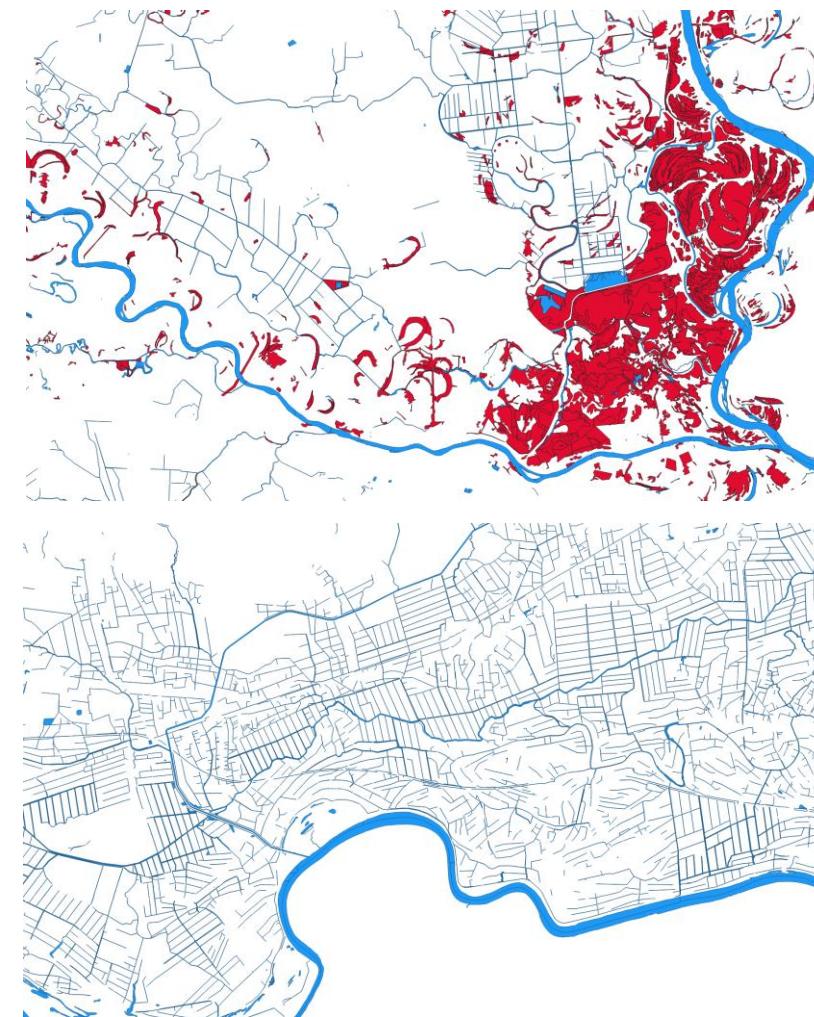
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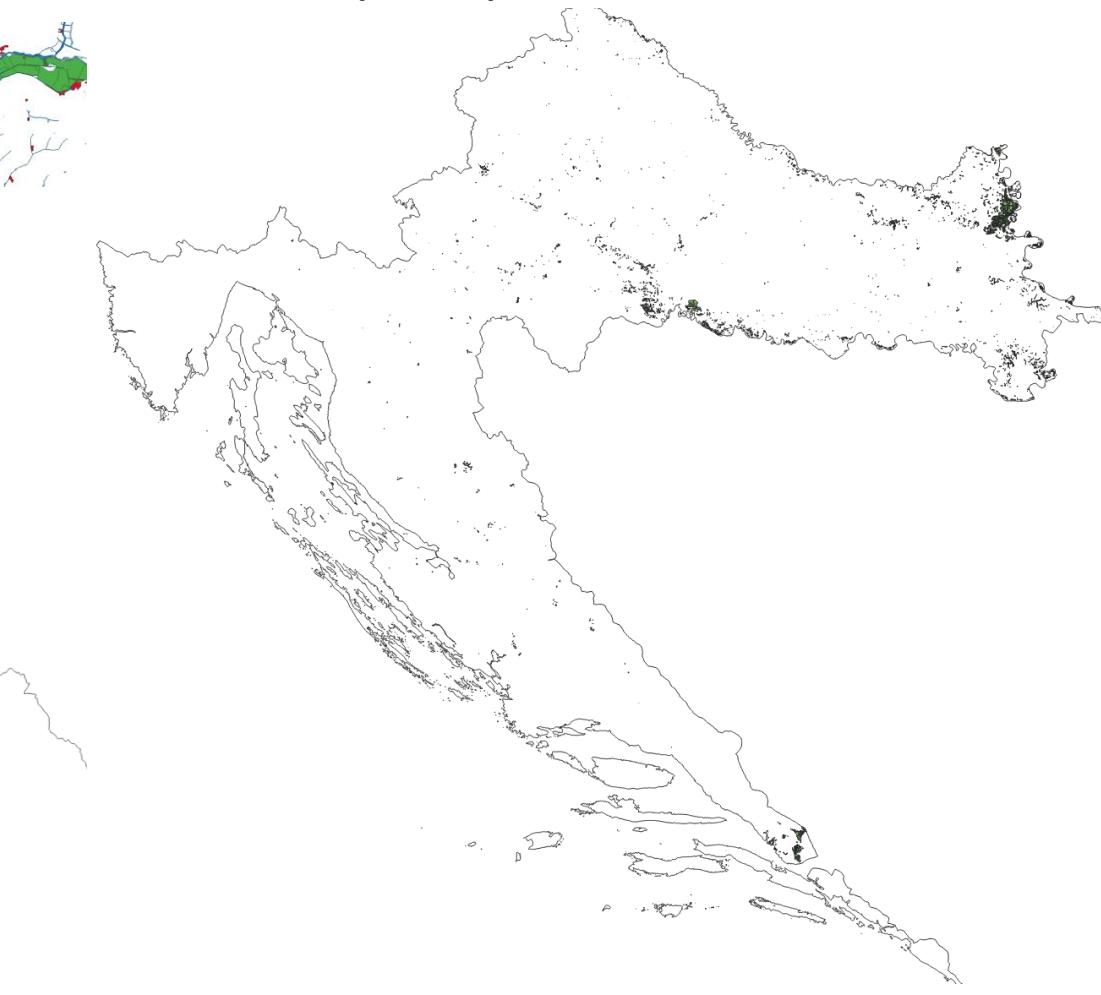
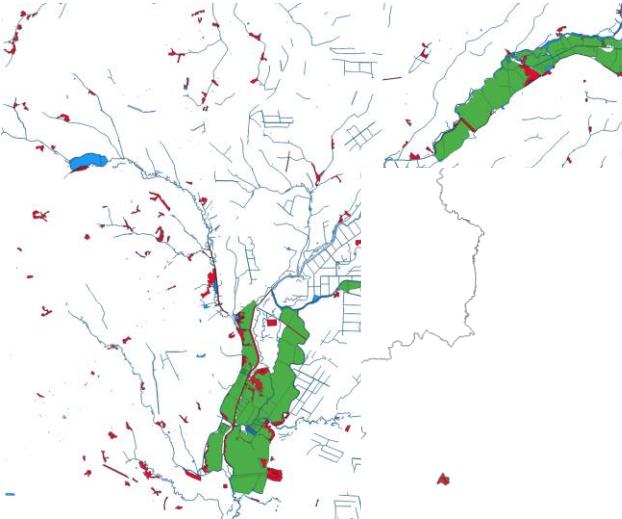
Faza 1 Prikupljanje nacionalnih LU podataka po klasama

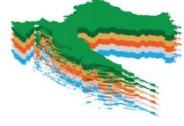
L1 Water use

- izvori: Hrvatske vode i Temeljna topografska baza (TTB)



Wetland Use
 Aquaculture use
 Other water Use

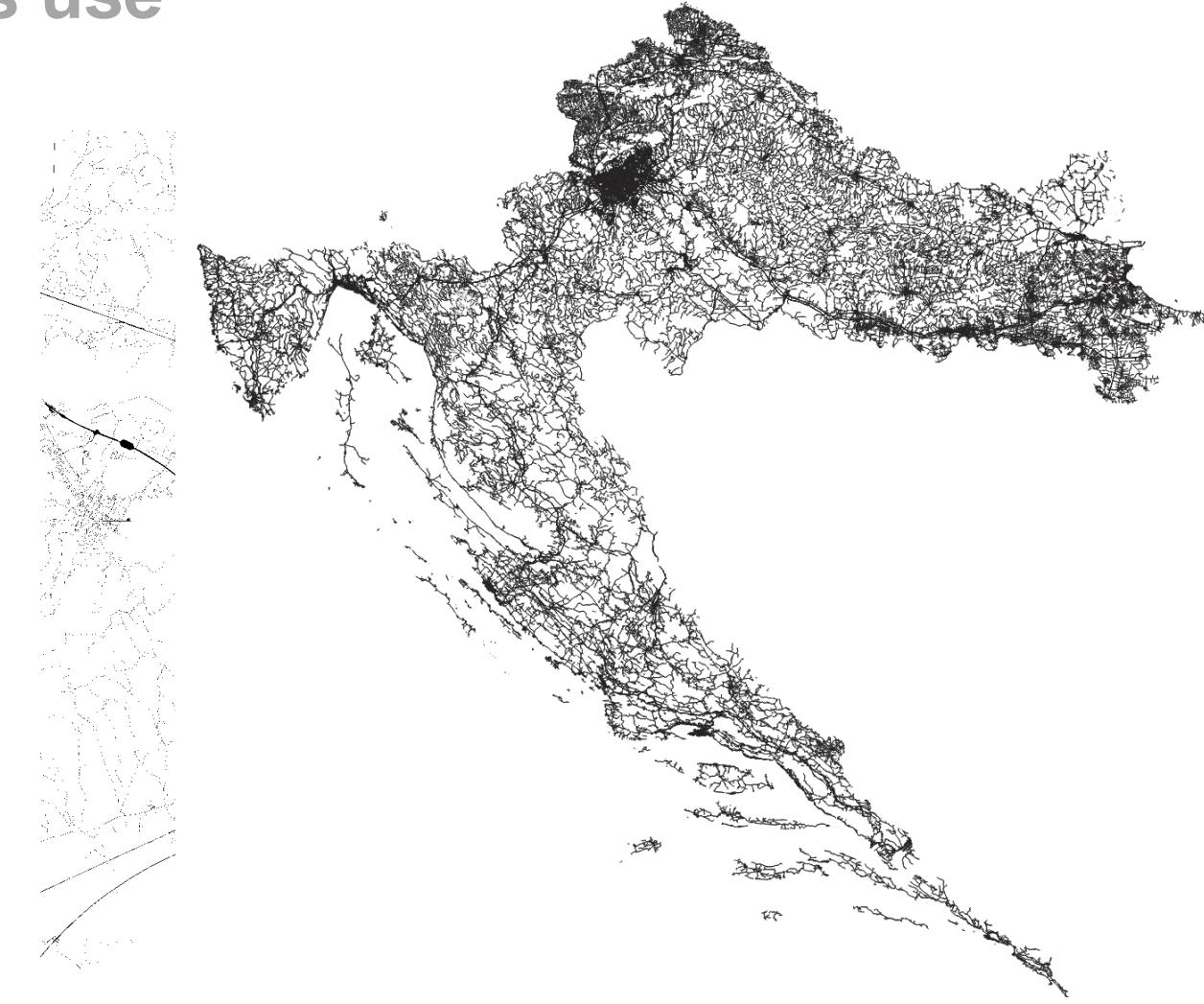




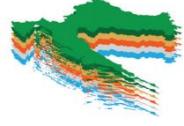
Faza 1

L2 klasa Transport & Logistics use

- izvor 1: TTB
- izvor 2: Hrvatske autoceste (HAC)
- izvor 3: Hrvatske ceste
- izvor 4: Hrvatske željeznice (HŽ)



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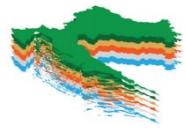
FAZA 2. Rasterizacija vektorskih podataka za svaku klasu

Vektorski sloj



Raster 5 m





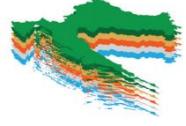
FAZA 3.

Spajanje pojedinačnih rastera u jedan **zajednički raster** za cijelu državu

- Po prioritetima

| Prioritet | Klasa (Level 2) |
|-----------|---------------------------------|
| 1 | Residential Use |
| 2 | Industrial Use |
| 3 | Service Use |
| 4 | Transport & Logistics Use |
| 5 | Utilities Use |
| 6 | Mining and quarrying Use |
| 7 | Deciduous forest |
| 8 | Coniferous forest |
| 9 | Maquis and shrub |
| 10 | Forest land |
| 11 | Arable Use |
| 12 | Grassland Use |
| 13 | Orchards |
| 14 | Vineyards |
| 15 | Olive grows |
| 16 | Mixed perennial crops |
| 17 | Greenhouse Use |
| 18 | Other agriculture Use |
| 19 | Wetland Use |
| 20 | Aquaculture use |
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| 23 | Grassland with woody vegetation |



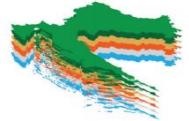


Faza 4. Popunjavanje praznina

- Praznine koje nijedan od korištenih izvora za L2 klase ne pokriva
- Praznine potrebno popuniti dodatnim wall-to-wall izvorom → NKS i CLC



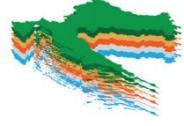
CROLIS LU **trenutna verzija**



Faza 4. Popunjavanje praznina

- Karta staništa (NKS) i CLC 2018 (urbane klase) – grupirana po L2 klasama
- NKS šumske površine kategorizirane kao Grassland with woody vegetation

| Klasa (Level 2) | CROLIS LU sloj – trenutna verzija (ha) |
|---------------------------------|--|
| Residential Use | 19,017 |
| Industrial Use | 2,759 |
| Service Use | / |
| Transport & Logistics Use | 1,910 |
| Utilities Use | 1,112 |
| Mining and quarrying Use | 616 |
| Deciduous forest | / |
| Coniferous forest | / |
| Maquis and shrub | / |
| Other forest area | / |
| Arable Use | 21,306 |
| Grassland Use | 94,088 |
| Orchards | 964 |
| Vineyards | 3,842 |
| Olive grows | 1,717 |
| Mixed perennial crops | / |
| Greenhouse Use | / |
| Other agriculture Use | 9,708 |
| Wetland Use | 1,323 |
| Aquaculture use | / |
| Other water Use | 686 |
| Other/no economic Use | 488 |
| Grassland with woody vegetation | 161,574 |



Cijeli LU sloj – L1 klase



CROLIS LU trenutna verzija

| Klasa (Level 1) | CROLIS LU sloj - trenutna verzija (ha) | NIR (National Inventory Report) 2021 (ha) |
|--------------------|--|---|
| Forestry Use | 2,447,260 | 2,401,873 |
| Agriculture Use | 1,461,837 | 1,521,932 |
| Permanent Crop Use | 140,187 | 121,462 |
| Grassland Use | 1,205,543 | 1,154,222 |
| Wetland Use | 97,232 | 75,356 |
| Urban Use | 264,709 | 287,956 |
| No economic Use | 191,696 | 218,062 |

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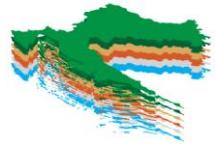
Cijeli LU sloj – L2 klase



CROLIS LU trenutna verzija

| Klasa (Level 2) | CROLIS LU sloj – trenutna verzija (ha) |
|---------------------------------|--|
| Residential Use | 168,035 |
| Industrial Use | 13,158 |
| Service Use | 13,859 |
| Transport & Logistics Use | 62,375 |
| Utilities Use | 1,959 |
| Mining and quarrying Use | 5,323 |
| Deciduous forest | 1,643,372 |
| Coniferous forest | 238,899 |
| Maquis and shrub | 557,734 |
| Other forest area | 7,255 |
| Arable Use | 1,303,876 |
| Grassland Use | 1,043,968 |
| Orchards | 31,172 |
| Vineyards | 61,349 |
| Olive grows | 47,428 |
| Mixed perennial crops | 237 |
| Greenhouse Use | 323 |
| Other agriculture Use | 17,452 |
| Wetland Use | 26,309 |
| Aquaculture use | 9,522 |
| Other water Use | 61,400 |
| Other/no economic Use | 191,696 |
| Grassland with woody vegetation | 161,574 |

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Analiza povijesnih snimaka

Sara Baćeković, Ekonerg



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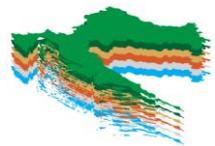


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Izvori za povijesno razdoblje

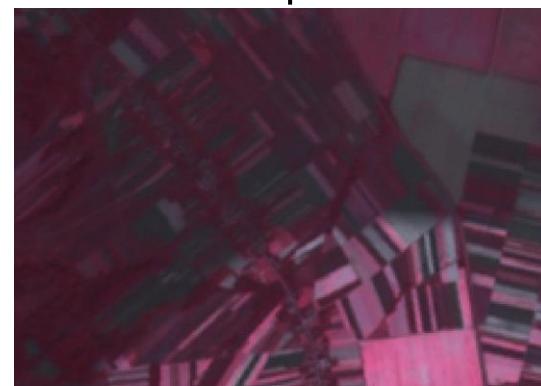
1968.



2000.



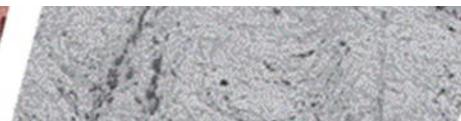
2020.

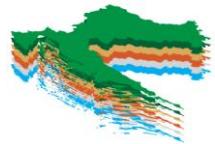


1990.



2010.



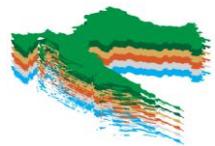


Digitalna ortofotokarta (DOF)

- rezolucija: 0.5 m
- oštećenja na snimkama
- otežano detektiranje trajnih nasada
- otežano razlikovanje oranica i travnjaka

1968.



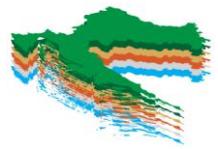


SPOT 1 satelitske snimke

- rezolucija: 10 m
- pomaci snimke
- otežano razlikovanje oranica i travnjaka
- teško razdvajanje uskih parcela i cesta

1990.



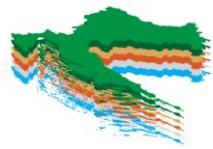


SPOT 4 satelitske snimke

2000.

- rezolucija: 10 m
- pomaci snimke
- otežano razlikovanje oranica i travnjaka
- teško razdvajanje uskih parcela i cesta





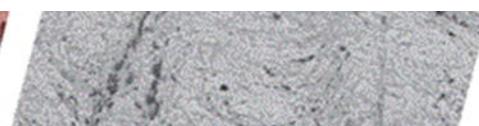
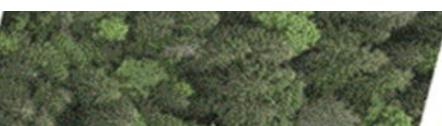
Digitalna ortofotokarta (DOF)

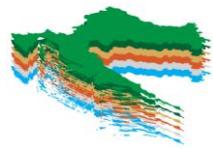
- rezolucija: 0.5 m

2010.



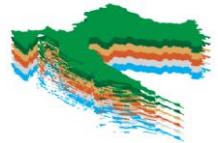
2020.





Uzorkovanje – vizualna interpretacija





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Marina Kukavica, Ekonerg



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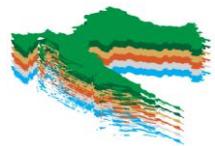


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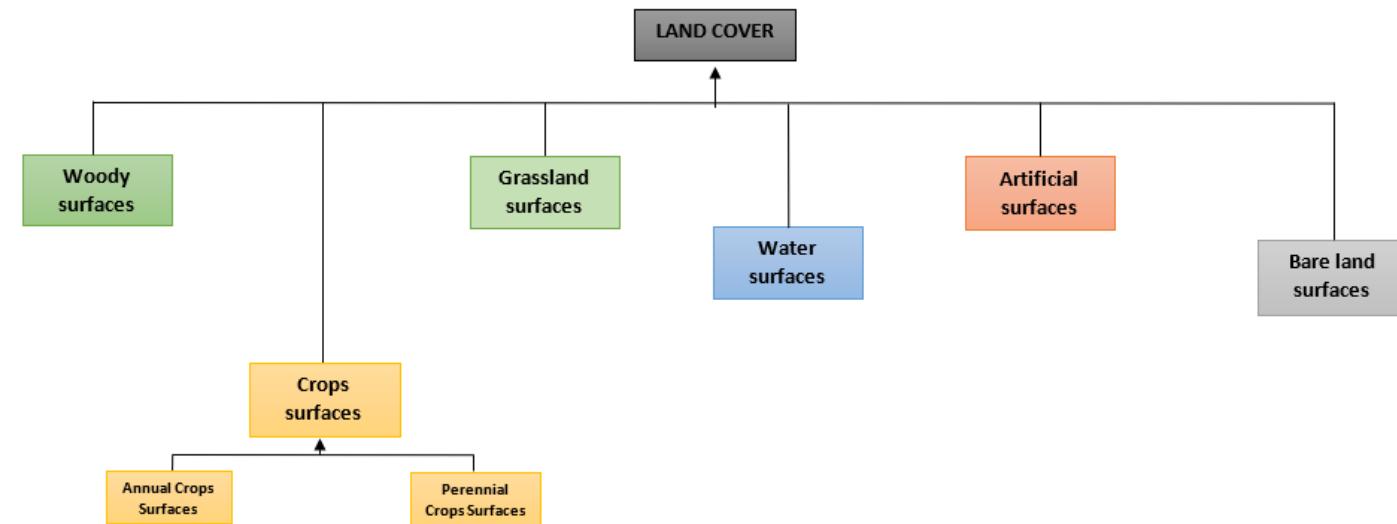
FOND ZA ZAŠTITU OKOLIŠA I
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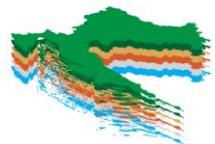
Land cover konceptualni model

- Kartiranje LC i LU za uspostavu sustava za monitoring zemljišta
 - metode daljinskih istraživanja
 - upotreba satelitskih i zračnih snimaka

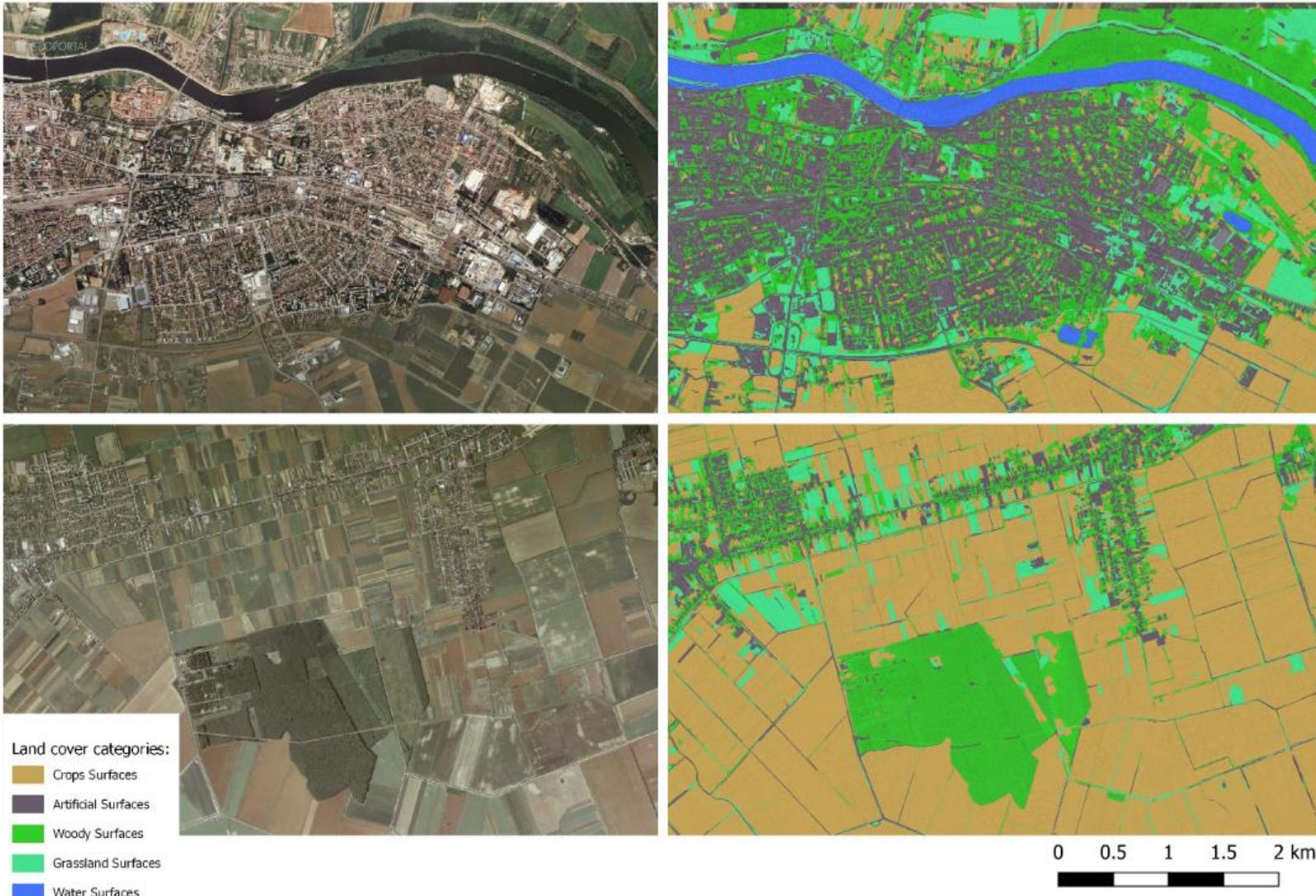


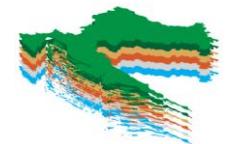
- Referentni CROLIS LC sloj - Objektno orijentirana analiza snimaka (OBIA)



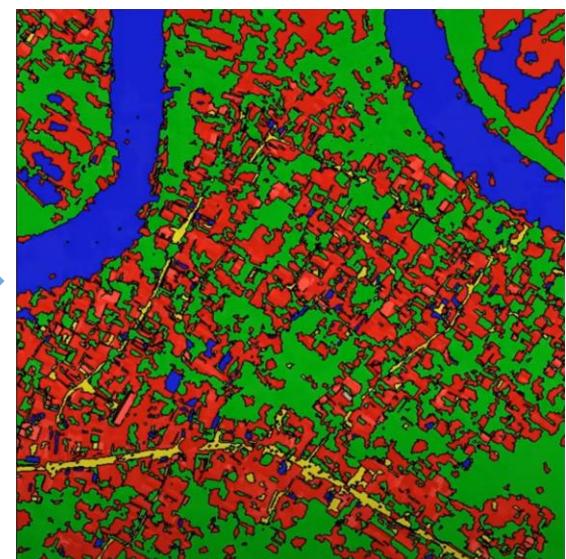
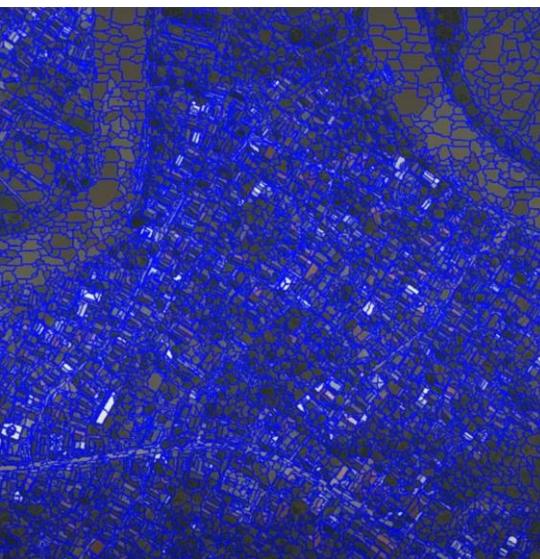


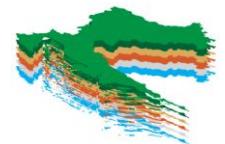
Objektno orijentirana analiza snimaka





Objektno orijentirana analiza snimaka



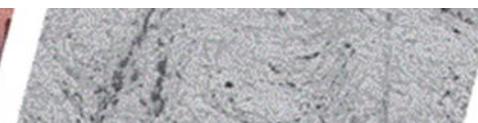
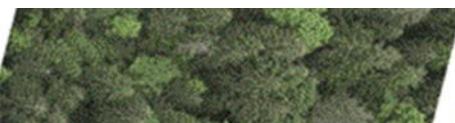


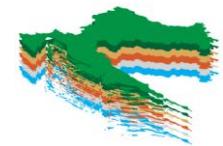
Objektno orijentirana analiza snimaka



Ulagni podaci za kreiranje LC sloja:

- DOF 5
- LIDAR nDSM
- Sentinel-2 satelitske snimke
- Vektorski podaci nadležnih institucija

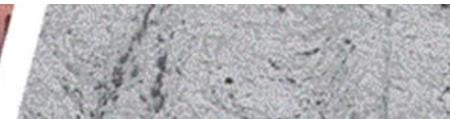
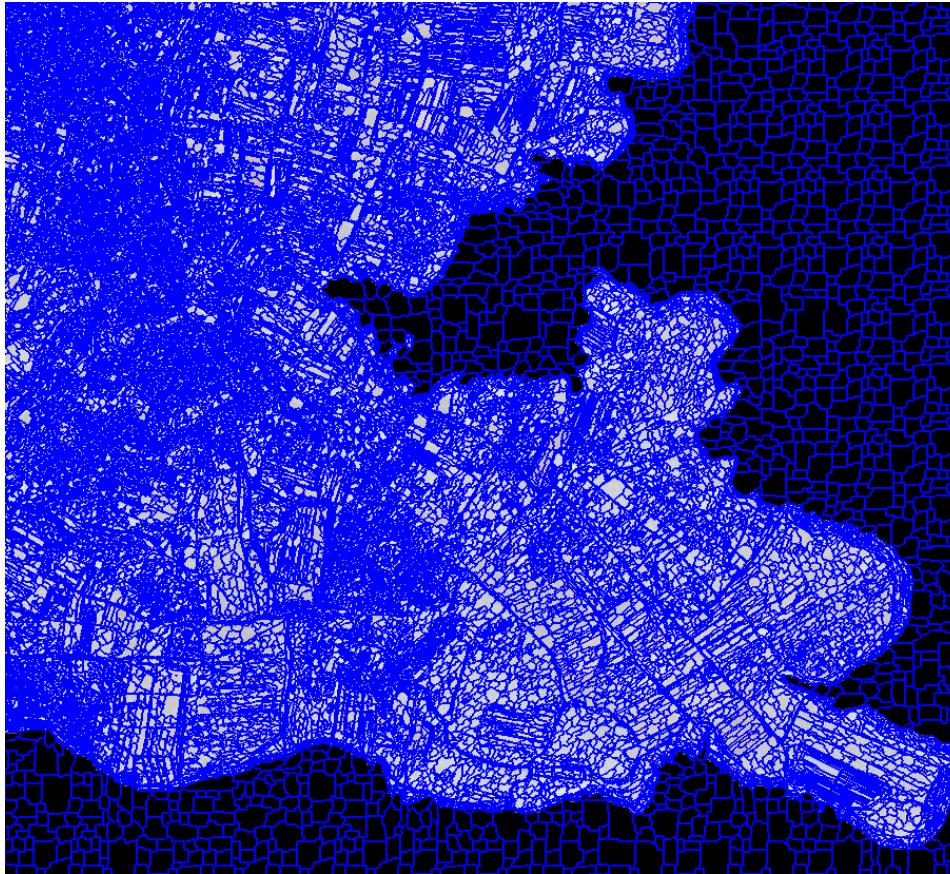


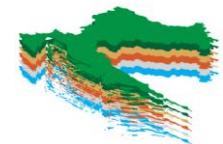


Objektno orijentirana analiza snimaka



- Segmentacija

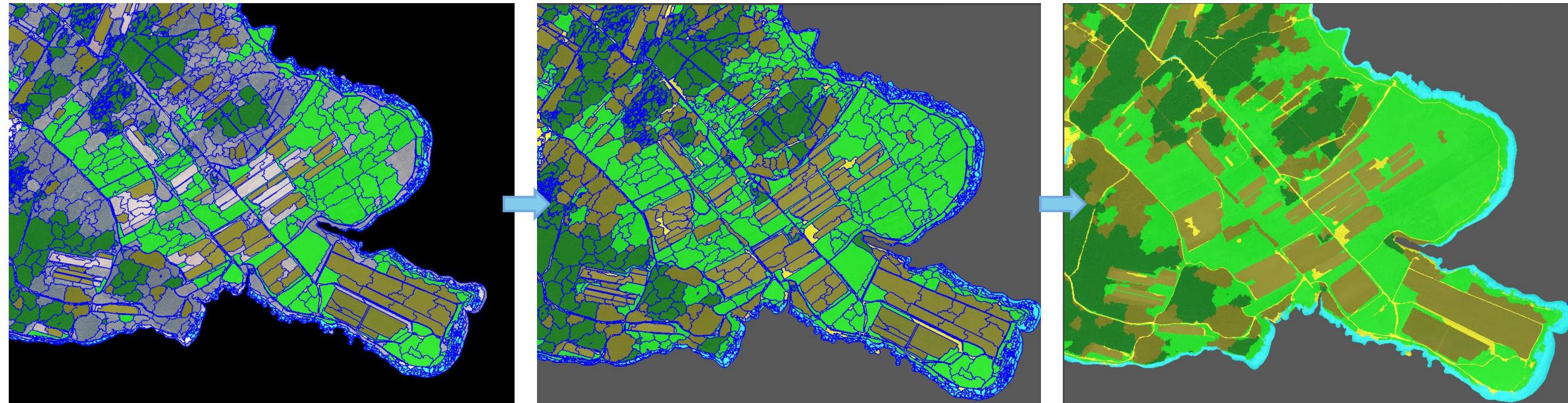


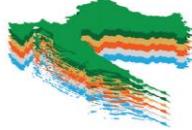


Objektno orijentirana analiza snimaka



- Klasifikacija





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i zelene tranzicije



AGENCIJA ZA
PLaćANJA U
POLJOPRIVREDI,
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RURALNOM
RAZVOJU



REPUBLIKA HRVATSKA
Državna geodetska uprava

