MAIA - Mapping and Assessment for Integrated Ecosystem Accounting

SEEA EA POLICY APPLICATIONS IN BULGARIA

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Key policy priority areas for Bulgaria identified:

1. Water regulation ES
2. Forest ES (extent, carbon sequestration, and significant natural heritage)
3. Biodiversity
4. Urban Areas (extent, ES)
5. Cultural ES (tourism, cultural heritage)
6. Supply and Use Tables for the ES above

So far, legislation in Bulgaria covers only monitoring and biophysical valuation of forest ecosystems outside NATURA 2000.

Demand exists to expand such legislation to the rest of the forests ecosystems and to the other ecosystems as well.

7 MAIA-SUPPORTED PILOT ECOSYSTEM ACCOUNTS

1. SEEA EA for Ecosystem *Assets*:

1.1 Ecosystem Extent Accounts: Work done so far, partly in MAIA:

1.1.1 The areas of all 9 ecosystem types (MAES typology): calculated for the 2000-2018 period (national scale), as well as the changes in these areas for the intermediate periods (2000-2006; 2006-2012 & 2012-2018) at different geographical & administrative levels, incl. level 3 & 4 (EUNIS Classification of Natural Habitats).

- A very significant issue with the marine ecosystem extent boundaries: resolved, due to the much improved coordination between the NSI and EExA within MAIA.

1.1.2 Another focus: **Forests extent** (**national** scale): Work done:

- Intersection of forest and woodland ecosystem types on national GRID 1x1 km2 and calculation of net changes, additions and reductions to extent in every grid cell from Corine Land Cover (2000-2018). Calculation of area of forest ecosystems inside Natura 2000 for 2018 year. Comparisons with the Global Land Cover Map.

- Intersection of forest and woodland cadaster parcels by their usage type on national GRID 1x1km2 from State Cadaster (2019, 2020 and 2021). Calculation of net changes, additions and reductions to extent of forest parcels in every grid cell.

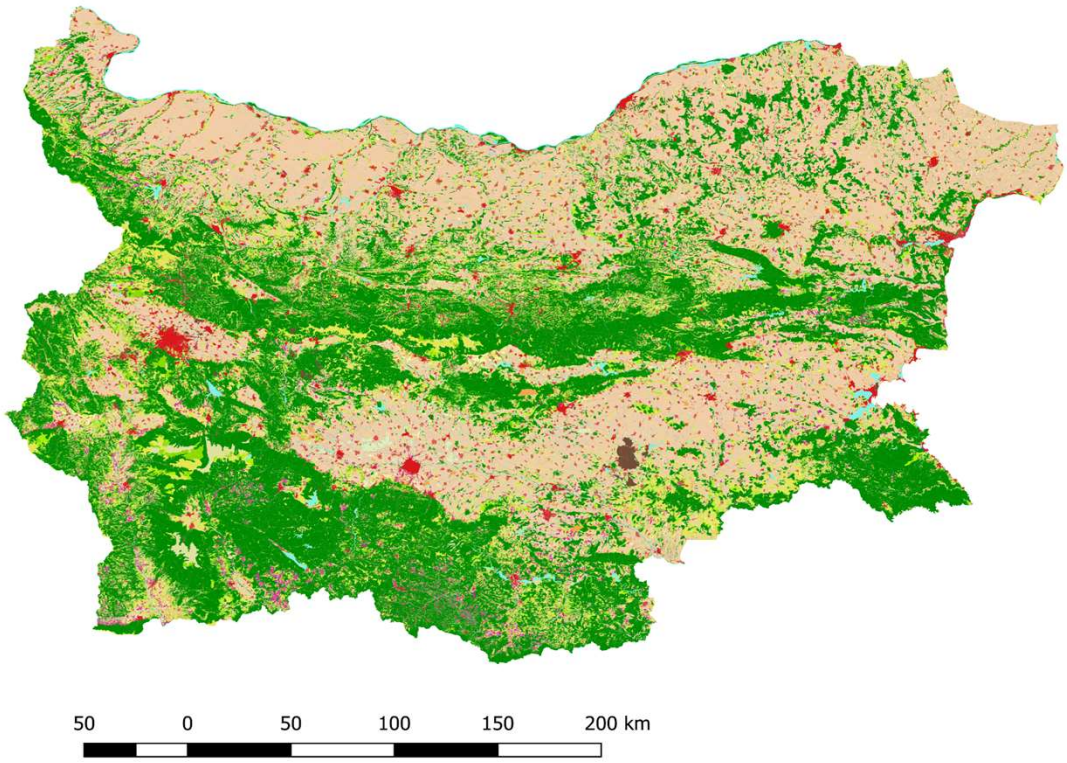
- Present area of forest ecosystems from the Forest Management Plans (FMP) by forest type from attributive table (42 types), EUNIS established and aggregated by level 2 MAES.

- Produced maps and SUT tables for timber and game meat provision services, both physical and monetary.

POLICY APPLICATIONS OF THE FOREST EXTENT ACCOUNT

- Due to the MAIA- established coordination between the NSI, Executive Forests Agency (ExFA), and State Cadaster:
- Corine landcover, supplemented by Forest Management Plans (forest types) and State cadaster forest parcels (forest for wood production and non-wood producing forest areas), will be used for producing extent accounts for forest ecosystems (to present changes in extent and accounting matrices).
- The FMP (cover the whole territory of the country) will be used to:
  - join forest types (forest polygons) with actual timber harvest from logging permits information;
  - for wood provision and global climate regulation services;
  - the Timber volume (standing biomass) in m3 is available for calculation of the forest biomass above ground.
- The logging permits data for 2018, 2019 and 2020 are added to the polygons of the FMP forests map. (The attributive data contain information about the annual fellings in ha, planned timber removals in m3, actual harvested timber in m3 by main tree species (106 species) and timber type by size.) The actual harvested timber amounts are aggregated by type (coniferous and deciduous) and by timber size and linked to forest polygons. The total harvested timber in m3 and national currency are allocated in every GRID cell for all years where there is harvest.
- To develop methods for estimating hunting provision services based on available data on the quantity of the killed big game distributed on the territory of the state forest enterprises and state hunting enterprises and average price of the gathered meat (average price based on the weight - €/kg).

Physical use of the physical blocks of the land (land use) 43503,9 km2



Legend

FB

FB_09032021_BG [1392671]

- Another type of permanent crops [39 038]
- Arable lands [153 736]
- Archeological objects [127]
- Bare and eroded lands [4 723]
- Build up land [391 850]
- Cemeteries [648]
- Disturbed areas [3 179]
- Energy and communication infrastructure [30 908]
- Forest land [73 472]
- Greenhouses [360]
- Gullies and ravines [15 272]
- Home yards [106 238]
- Mixed land use [24 497]
- Orchards [9 278]
- Other areas with non-agricultural use [680]
- Paddy fields [1 177]
- Pastures, marah and meadows [181 669]
- Rivers [7 025]
- Roads and trenches [56 604]
- Shrubs [179 682]
- Sparse vegetation [4 424]
- Sport and leisure [1 803]
- Transport network [64 786]
- Vineyards [12 845]
- Water technical facilities [16 913]
- Wetlands and water areas [11 737]

MAIA-SUPPORTED PILOT ECOSYSTEM ACCOUNTS IN BULGARIA

2. SEEA EA Accounts for Ecosystem *Services* - Supply & Use (in physical terms):

2.1 Cultural Ecosystem Services (local)

- Focus on the eco-services provided by Natural Heritage (NH) Sites

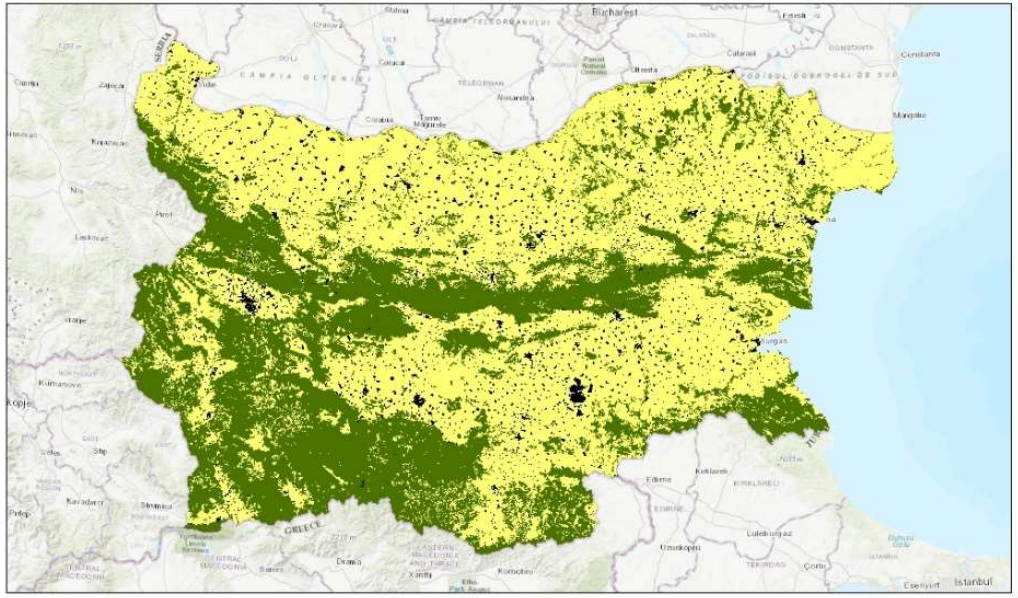
- Adaptation of ESTIMAP & testing to identify (at national scale) the places with high & v. high recreation potential at the local scale. Most of them: at the same time protected areas.

- Results:
  a/ Recreational Provision Potential map &
  b/ Recreation Opportunity Spectrum (ROS) map (reclassifies the land cover, according to the possibilities it offers & the proximity to potential users;
  - Assessment of cult. services provided by the different categories of protected areas
  - Assessment of the NH sites' capacity for nature-based tourism (Nikolova et al. 2021).

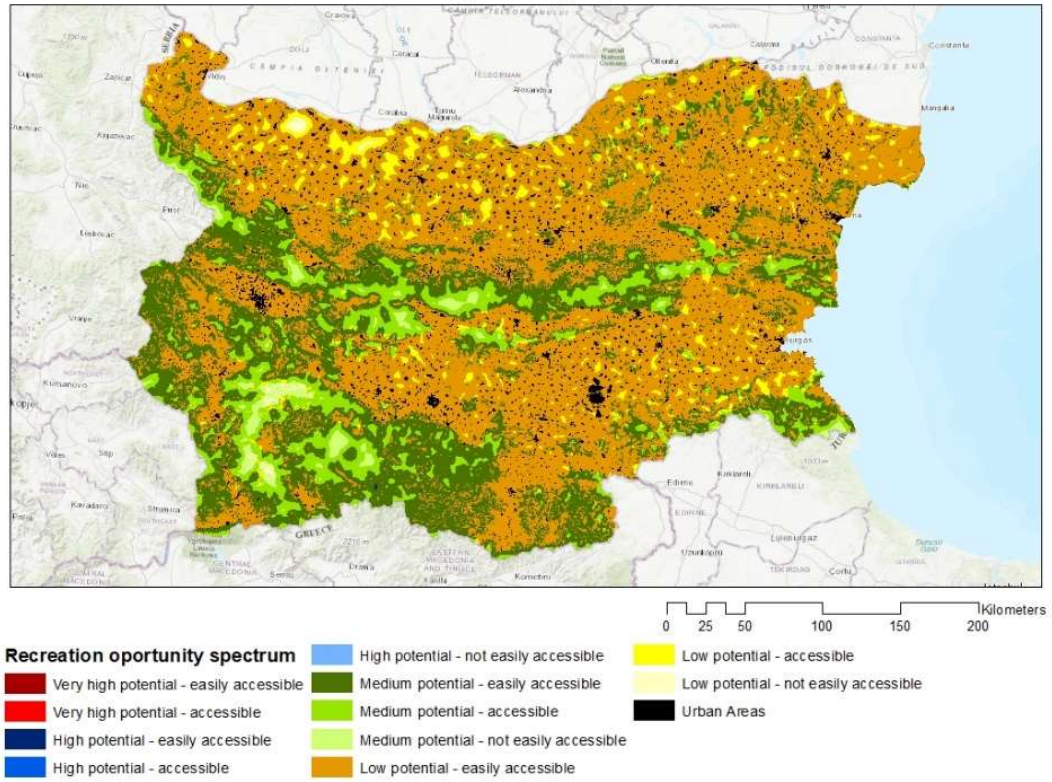
- Publication: Ihtimanski I, S. Nedkov, L. Semerdzhieva (2020) Mapping the natural heritage as a source of recreation services at national scale in Bulgaria. One Ecosystem 5: e54621. https://doi.org/10.3897/oneeco.5.e54621 Pensoft, ISSN:2367-8194.

SEEA-EA Accounts for Ecosystem Services: 2.1 Supply and Use (physical terms): ***Cultural Ecosystem Services (local): Work* to Date**

Recreation potential



Recreation Opportunity Spectrum



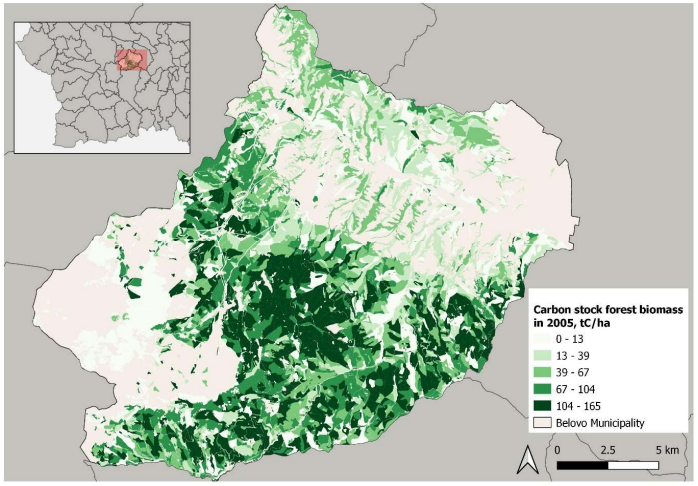
MAIA-SUPPORTED PILOT ECOSYSTEM ACCOUNTS IN BULGARIA

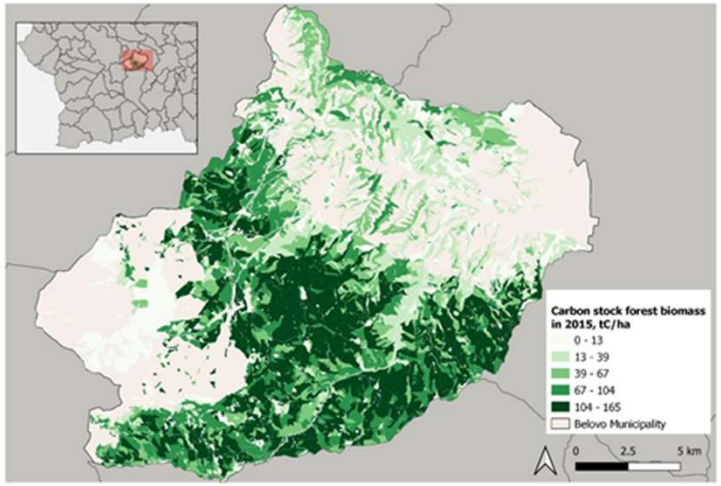
3. SEEA EA *Thematic* Accounts:

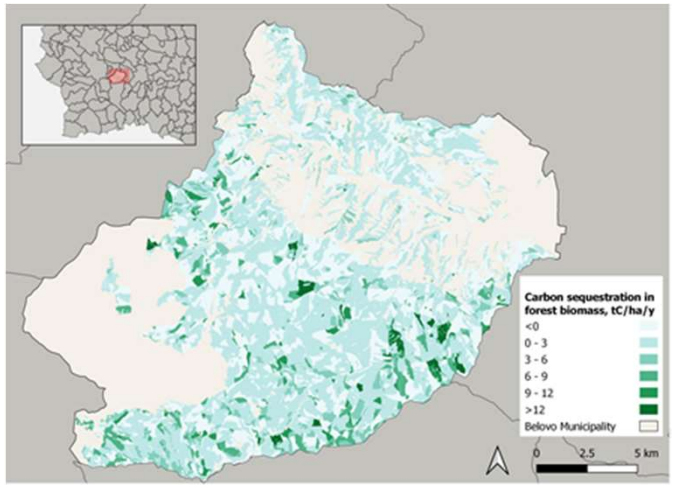
3.1 *Carbon Account* (for Forest Areas) *(local)*

Achievements to date:

1. Testing of 2 approaches for carbon stock & flow estimates in forest biomass (for both aggregated & detailed data)
2. Comparative analysis of the results (in terms of feasibility, accuracy & technical implementation)
3. Results confirm the use of more detailed data for local level carbon accounting for forests.





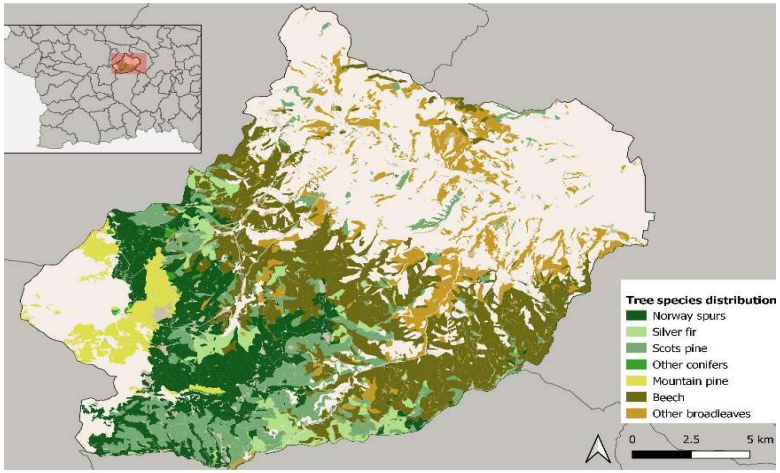


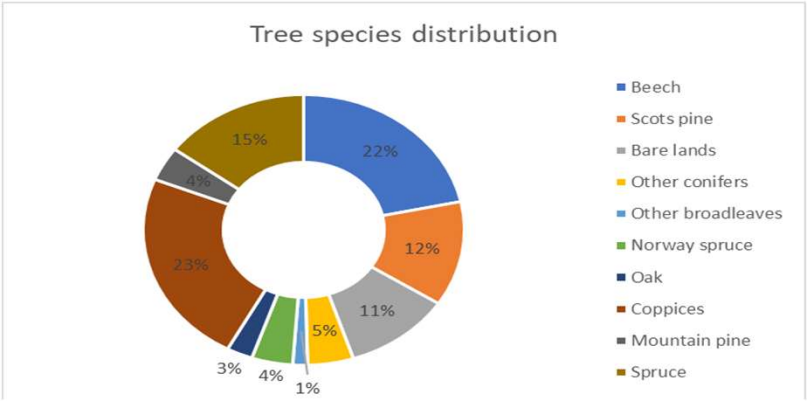
- The case-study area (Belovo State Forest Enterprise - 346 km2) encompasses forests managed for timber production and protection.

- The study provides data on carbon stock changes in the forest ecosystems:

- Of particular policy interest in view of the mitigation potential of these ecosystems in reducing the GNG emissions.

Opening stock – 1759.737 ktC*
Additions to stock – IE
Reduction to stock – IE
Net Carbon Balance – 218.028 ktC
Closing stock – 1977.765 ktC
*- only biomass





Policy Implications

- The carbon account contributes to monitoring the implementation results from the climate change policies, since there is currently no specific tool to trace their impact on the agricultural and forestry sector, especially in terms of trade-offs and/or synergies within the ecosystems and their potential to provide various ecosystem services.
- The SEEA-EA provide spatially-explicit information, which upgrades the databases that support international reports and accounts, such as FAO-FRA, Forest Focus, GHG Inventory and etc.
- The main SEEA- EA implication for Bulgaria is the emphasis on the economic significance of conserving and maintaining the ecosystems in good condition. It accelerates policy developments that integrate introduction of environmental taxation, payments of rent on natural resources, environmental subsidies, etc.

3.2 Thematic account „Biodiversity“

Work to date: The calculation of the Red List Index, based on the 3 Red book volumes: Vascular Plants (1984) and Vertebrate animals (1985), and Algae, Mosses, Vascular Plants, Fungi, Invertebrates, Pisces, Amphibia, Reprilia, Aves and Mammals, Habitats (2015).

The calculation method uses Bubb, P. J. et al. (2009). IUCN Red List Index-Guidance for National and Regional Use. Gland Switzerland: IUCN.

Result:
The decrease in the Red List Index has been established for both plants and animals, which demonstrates a **deterioration in the status of species of high conservation importance** in Bulgaria.

Species accounts

Work done in 2022 only:

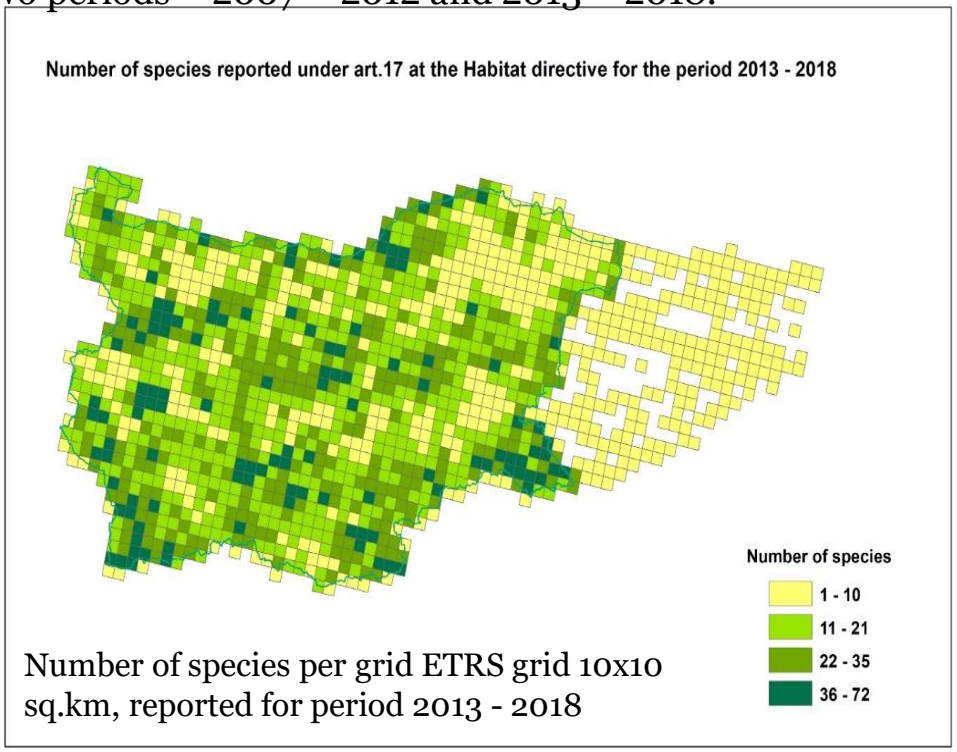
- Data source - National reports for art. 17 of the Habitat Directive and art. 12 of the Birds Directive.
- Methodology – UNEP-WCMC (2017) “Testing the development of species accounts for measuring ecosystem condition at EU level”.
- Species accounts - Species Conservation Status (art.17) and Species Status accounts (art.12).

Policy implications:

- The adopted national methodology for mapping of ecosystems and ecosystem condition accounting will influence regional and local policies by supporting higher criteria.
- The ecosystem accounting and, in particular, biodiversity accounts will be used in amending and supplementing national legislation and regulations, such as the Environmental Protection Act and the Biodiversity act.
- The information from the biodiversity accounts will serve as an important quantitative dimension for the state of biodiversity and they will be a measurable variable in evaluating the effectiveness of the policies regulating the functioning of the Bulgarian BD monitoring system, which includes ecosystem assessment.

Species Conservation Status (Art.17 of the HD)

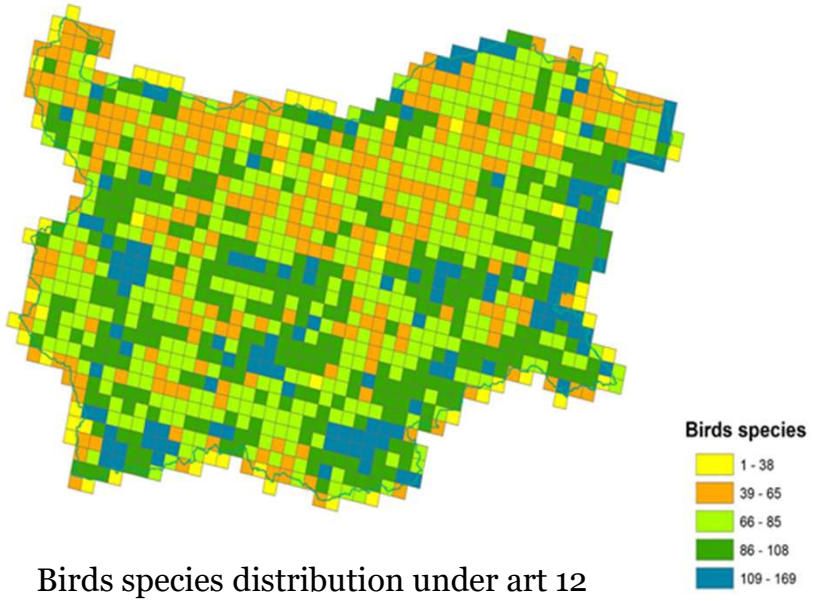
Conservation status index – net changes on ecosystem level on terrestrial biogeographical regions, reported under art 17 of the Habitat Directive for two periods – 2007 – 2012 and 2013 – 2018.



Number of species per grid ETRS grid 10x10 sq.km, reported for period 2013 - 2018

Species status accounts (Art.12 under Birds Directive)

Aggregate index comparing reported data under art.12 BD, for terrestrial ecosystems in two reported periods: 2007 – 2012 and 2013 - 2018



Birds species distribution under art 12 of the Bird Directive

3.3 Thematic Account: URBAN ES

Achievements to Date/Status - ongoing

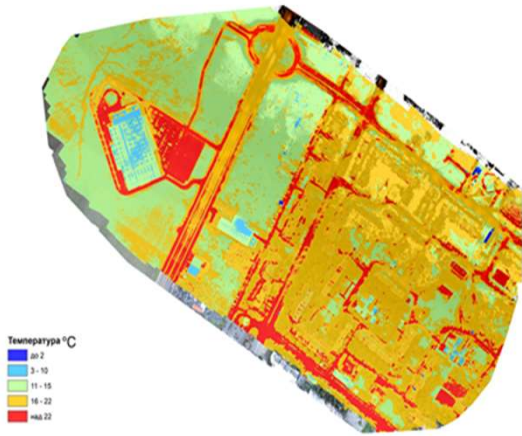
I. Focus on **Local climate regulation:**

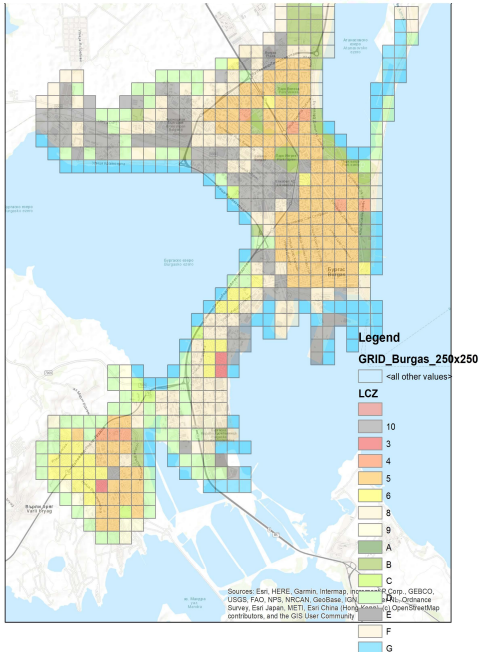
- **for the 1st time BG started monitoring the Cooling Effect of specific urban areas**: Sofia (2020) & Burgas (2021)

II. Scale: **Municipal/Regional Policies**

III. Actual data collection and analysis of the **land surface temperature variations** by Local Climate Zone (*Dimitrov et al 2021; Venter, Krog and Barton, 2020; Marando et al., 2019)*

IV. Policy Applications: to be used by urban planning in areas with diverse features and conditions)



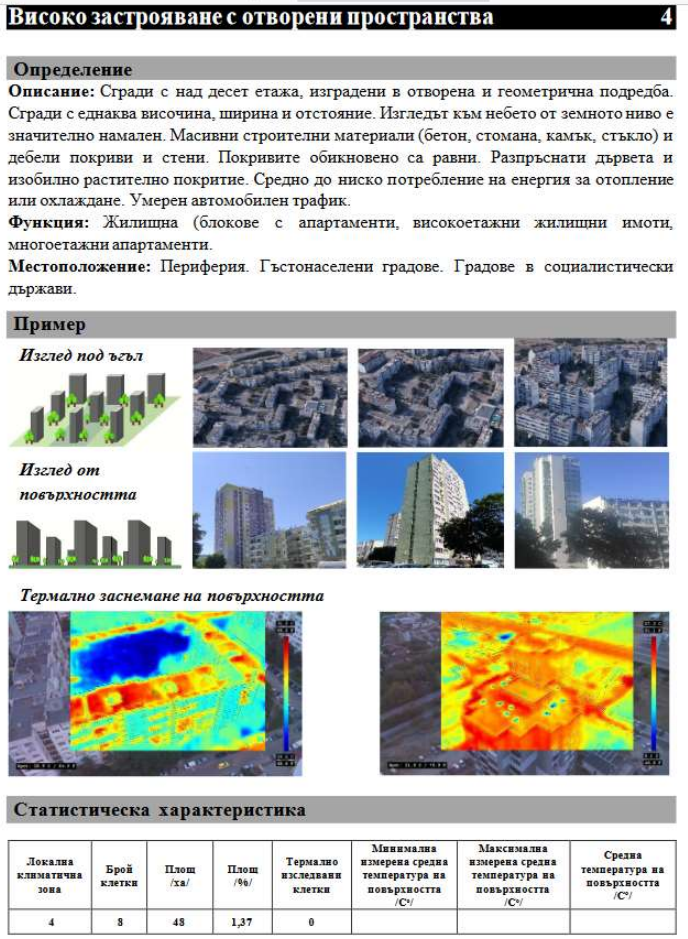


Thematic Account: URBAN
Achievements to Date/Status - ongoing

VII. Cooling Effect Analysis:

1. Temperature differences between green and gray infrastructure by types of Local Climate Zone
2. Temperatures of the representative units (city park, suburban park, street landscaping, etc.)
3. Changes in the surface temperature in the buffer (200-400 m distance from a green element)
4. Geospatial statistical analyses.

In development: *Catalog of the Intensity of the Surface Urban Heat Island (SUHI)* **for urban planning and regional organization purposes**. The goal: incorporate the above information in the respective urban planning geospatial units and thus, enable periodical data collection and fulfillment of the 'time step' accounting requirements.



Високо застрояване с отворени пространства 4

Определение

Описание: Сгради с над десет етажа, изградени в отворена и геометрична подредба. Сгради с еднаква височина, ширина и отстояние. Изгледът към небето от земното ниво е значително намален. Масивни строителни материали (бетон, стомана, камък, стъкло) и дебели покриви и стени. Покривите обикновено са равни. Разпръснати дървета и изобилно растително покритие. Средно до ниско потребление на енергия за отопление или охлаждане. Умерен автомобилен трафик.

Функция: Жилищна (блокове с апартаменти, високоетажни жилищни имоти, многоетажни апартаменти.

Местоположение: Периферия. Гъстонаселени градове. Градове в социалистически държави.

Пример

Изглед под ъгъл

Изглед от повърхността

Термално заснемане на повърхността

Статистическа характеристика

Локална климатична зона	Брой клетки	Площ /ха/	Площ /%/	Термално изследвани клетки	Минимална измерена средна температура на повърхността /C°/	Максимална измерена средна температура на повърхността /C°/	Средна температура на повърхността /C°/
4	8	48	1,37	0			

CONCLUSION

- All of the data, information, knowledge, and research methods and results (mapping, analyses, syntheses, evaluations, and forecasts), obtained within the process of creating environmental accounts, serve policy application and environmental management decision making at all geographic scales.

- In Bulgaria, most EA applications affect, first and foremost, legislation in all aspects, activities, and forms of the economic, environmental, and recreational systems, including laws, regulations, government and judicial decisions, strategic documents and regulations, geospatial organization, building permits, urban, territorial, and regional planning, sustainable regional development, and administration. On the other hand, the uptake in state financial institutions seems less enthusiastic.

- In addition to state institutions, EA applications in Bulgaria benefit NGOs, like the WWF-Bulgaria and a number of private stakeholders, e.g., environmental consulting companies.

MAIA
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Thank you for your attention!

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and

http://maiaportal.eu/

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