



# Доклади на конференции

Доклад за междинен резултат Д1.2.2

31 март 2023

Автори:

Ваня Стойчева, Стоян Недков, Христина Проданова, Гергана Петкова,  
Десислава Христова

- INES -

Интегрирана оценка и картиране на свързани с водите  
екосистемни услуги подпомагащи природно-базирани решения  
в управлението на речните басейни

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*Конкурс за финансиране на фундаментални научни изследвания – 2021*

Проект: **Интегрирана оценка и картиране на свързани с водите екосистемни услуги подпомагащи природно-базирани решения в управлението на речните басейни (INES)**  
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Уебсайт: <https://inesproject.com/bg/>

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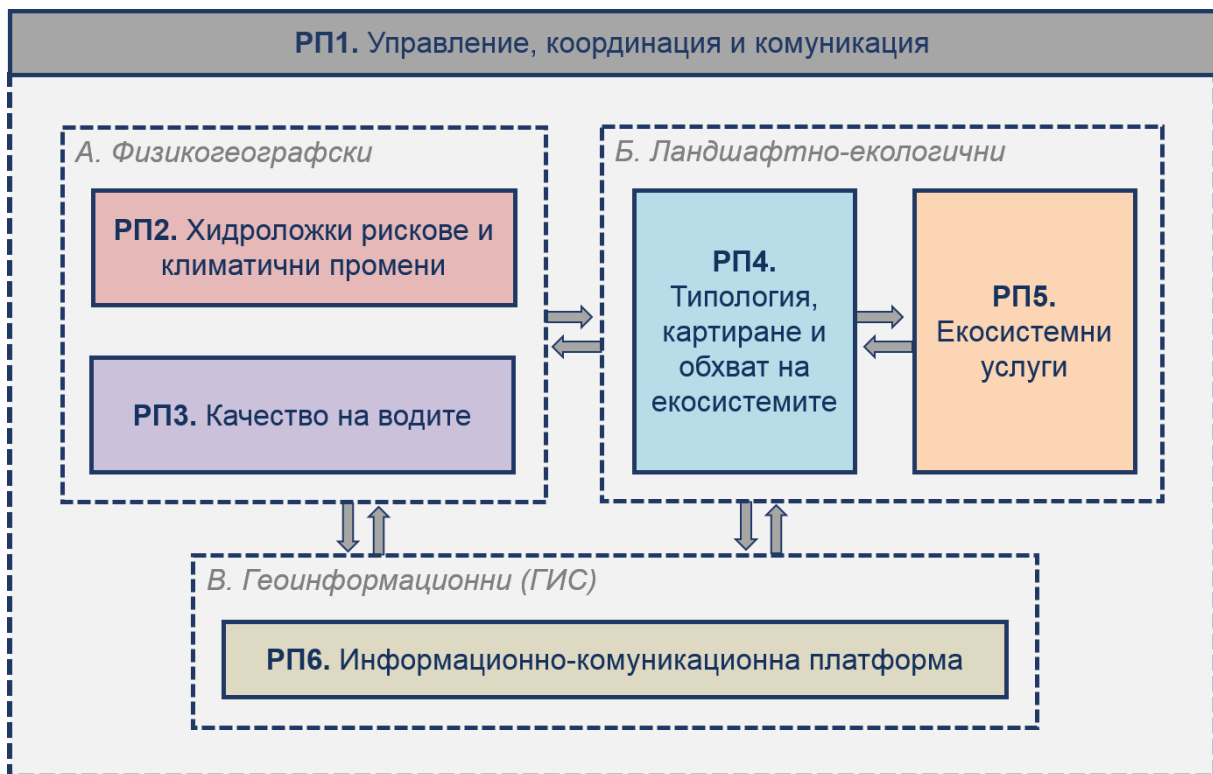
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# 1. Въведение

Оценката и картирането на екосистемните услуги са заложили като важен елемент в Европейската стратегия за биоразнообразие и се координират от създадената за нейното изпълнение работна група MAES към Европейската комисия. Създадената от групата методическа рамка е развита за България под формата на девет методики, покриващи деветте основни екосистемни типа. Чрез проект INES се развива тематиката за свързаните с водите екосистемни услуги, която досега не е разработвана в цялост за България. Основната цел на проекта е разработване на методическа рамка за картиране, моделиране и оценка на свързаните с водите екосистемни услуги (СВЕУ) с оглед прилагането на природно-базирани решения в дейностите, свързани с управлението на водите. С реализирането на този проект, посредством интегриране на елементи от методиките за картиране и оценка на деветте отделни екосистемни типа и доразвиването им в частите, свързани с регулацията на хидроложки рискове и качество на водите, ще се разработи гъвкава методика, базирана на приложение на съвременни подходи за пространствени анализи и моделиране. Тази методика ще даде възможност да се оцени количествено прилагането на природно-базирани решения (NbS) за дейности като управлението на риска от наводнения, ерозия, смекчаване на последствията от климатичните промени и адаптиране към тях, смекчаване на влиянието на горещите вълни и на „островите на топлина“ в градската среда, и др.

В настоящия доклад се представя резултатът от работата по проекта, в рамките на дейност 1.2 Комуникация и разпространение на резултатите, от работен пакет 1 „Управление, координация и комуникация“ (Фиг. 1).



Фигура 1. Схема на работните пакети на проект INES.

## 2. Научни публикации


Съгласно заложената работна програма и планираните резултати от дейността по проекта, към месец 16-ти (31.03.2023 г.) са публикувани четири научни публикации: две научни статии в пълен текст, една статия тип review paper, и едно научно съобщение. Те са публикувани в списание "Journal of the Bulgarian Geographical Society".

### 2.1. РП 2

В рамките на РП 2 „Хидроложки рискове и климатични промени“, Дейност 2.1 „Преглед и анализ на съществуващото състояние“ и резултат D. 2.1.1. (Христова и др. 2022) е публикувана научна статия (Фиг. 2), дискутираща използването на резултатите от моделирането на регулирането на наводненията за целите на екосистемните сметки (Nikolov et al. 2022). Публикацията е в съавторство на докторанти от екипа.

Пълният текст на научната публикация е наличен на адрес: <https://doi.org/10.3897/jbgs.e86288>

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## Modeling of flood regulation for ecosystem accounting: a case study of Ogosta river basin

Petar Nikolov <sup>a,b,\*</sup>, Desislava Hristova <sup>a</sup>, Vanya Stoycheva <sup>a</sup>


<sup>a</sup>National Institute of Geophysics, Geodesy and Geography - Bulgarian Academy of Sciences (NIGGG-BAS), Sofia, Bulgaria  
<sup>b</sup>Faculty of Geology and Geography, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria  
\* Corresponding author: petar.nik91@gmail.com

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*Key words:*  
actual flow, ArcSWAT, ecosystem services, SEEA-EA, SDA, SPA

**ABSTRACT**

The System of Environmental-Economic Accounting – Ecosystem Accounting (SEEA-EA) is a spatially-based, integrated statistical framework for organizing biophysical information about ecosystems, measuring ecosystem services (ES). Water flow regulation ES and biophysical modeling are among the main topics in the individual ES part of the SEEA-EA framework and flood regulation ES is one of the important services. Characterizing and assessing flood regulation is a challenging task as both assessment and accounts of this ES need various data which are usually not available through direct or indirect measurements, therefore modeling approaches of water regulation are much needed. Despite growing attention and studies using hydrologic models to assess and/or map flood regulation ES, the accounting of this service is still not well developed. In this paper, we present an approach for accounting flood regulation at a local scale using ArcSWAT modeling. It is based on the results of flood regulation ES assessment, where modeling results are used to quantify the ES indicators and delineate the service providing areas (SPA) and service demand areas (SDA). The actual flow of flood regulation is calculated as a ratio between ES demand and ES potential and it represents the area of SPA which corresponds to the demand for flood regulation represented by SDA. The results show that predominant flood regulations ES supply is provided by the forest ecosystem as well as the actual flow. The accounting of flood regulation is strongly determined by ecosystem extent mapping. The CORINE Land Cover (CLC) provides the most appropriate and available data for mapping ecosystem extent at smaller scales. However, at a larger scale, it is too coarse and the combination of Mapping and Assessment of Ecosystems and their Services (MAES) national ecosystem mapping gives better results.



### 3.3 Actual flow and accounting table

The extent account is performed using a 1x1 km grid. The grid is intersected with the SPA and SDA polygons and each cell of the grid is assigned to a particular category. Then, the grid is intersected with the CLC data (available for 2000, 2006, 2012, and 2018) and the results are distributed into ecosystem subtypes following the MAES typology and its implementation in the mapping of ecosystems

The accounting table contains the ES potential (calculated by SPA), ES demand (calculated as SDA), and ES actual flow for four periods corresponding to the time series of CLC data (Table 2). The predominant part of the ES potential (76%) is provided by Woodland and forest ecosystems. Grassland (13%) and cropland (8%) have a small contribution, while the urban and sparsely vegetated areas have almost no contribution to the ES potential. The changes in woodland and forest ecosystems during the four periods are quite small. There

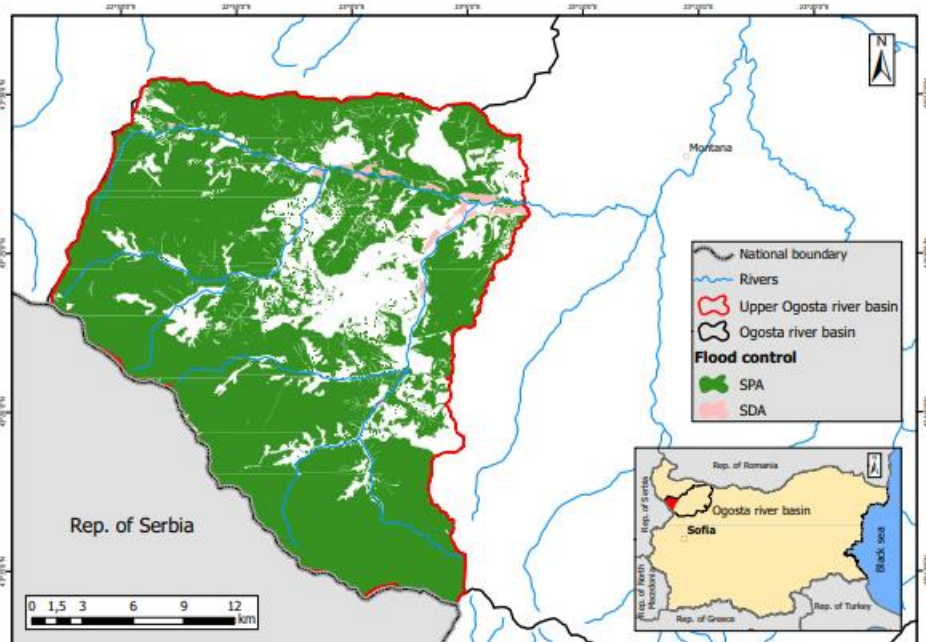


Figure 2. Service Demand Areas (SDA) and Service Providing Areas (SPA) in the upper part of the Ogosta river basin.

Фигура 2. Избрани акценти от публикацията (Nikolov et al., 2022).

## 2.2. РП4

В резултат от работата по РП 4 „Типология, картиране и обхват на екосистемите“ и Дейност 4.1 „Преглед и анализ на съществуващото състояние“ (Проданова и др. 2022) е публикувано научно съобщение (Фиг. 3), представящо първичните резултати от прегледа на националната база данни за екосистемите в България (Petkova et al. 2022). Съобщението е в съавторство на студент, млад учен и докторант от екипа на проекта.

Пълният текст на научното съобщение е наличен на адрес: <https://doi.org/10.3897/jbgs.e99268>



## Analysis of the national ecosystem database of Bulgaria: (Mis)matches with the MAES framework

Gergana Petkova , Hristina Prodanova \* , Vanya Stoycheva 

National Institute of Geophysics, Geodesy and Geography – Bulgarian Academy of Sciences, Sofia, Bulgaria

Corresponding author: hristina.zh.prodanova@gmail.com

### Key words:

ecosystem services, INES, integrated water management, MAES, topology

### ABSTRACT

The mapping of ecosystems is a significant element in the European Biodiversity Strategy and the results of its implementation should support the maintenance and restoration of ecosystems and their services. The quality of the spatial data is of crucial importance for the achievement of these goals. A methodological framework for Bulgaria in the form of nine separate methodologies has been developed in recent years. In this paper, we analyze the ecosystem typology for Bulgaria and the GIS database to assess the possibilities to develop a common database for the needs of integrated water management. The data analyses were carried out in two dimensions: 1) the typology and attributive data were analyzed by cross-tabular approach; and 2) the spatial data were analyzed by topology rules. The results of the study reveal three main problems of the typology: 1) for some types it is developed to the fourth level while for others it is to the third level; 2) in some of the ecosystem types, especially in the freshwater ecosystems, different categories are mixed within a single hierarchical level; 3) there are duplicated numerical designations between grassland and forest ecosystems. This necessitates a revision of the typology and the development of a correct uniform classification to be used for the needs of integrated assessment. The topology analyses of the merged data from the eight ecosystem GIS layers show extremely large numbers of gaps and overlaps. The main reason is the use of different sources for the mapping of different ecosystem types. The main conclusion is that it is practically impossible to generate topologically correct integrated GIS layers from the eight ecosystem type layers. Therefore, it is necessary to develop a new approach for mapping all ecosystem types into a uniform database.

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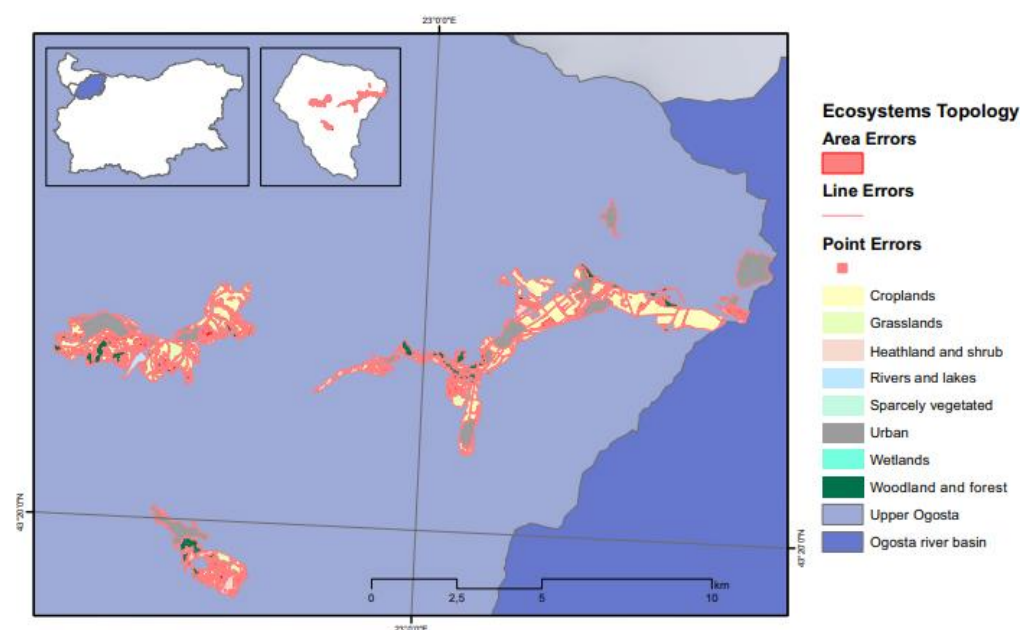


Figure 6. Overall view of the identified gaps and overlaps for the case study of the upper Ogosta river basin.

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### 2.3. РП 5

В резултат от работата по РП 5 „Екосистемни услуги“ и Дейност 5.1 „Преглед и анализ на съществуващото състояние“ е публикувана статия тип review paper (Фиг. 4), представяща резултати от прегледа на публикациите, разглеждащи регулиращите екосистемни услуги в урбанизирани екосистеми и тяхната връзка с градското планиране (Стойчева и Недков 2023; Stoycheva and Geneletti 2023). Литературният преглед е в съавторство на докторант от екипа на проекта и утвърден специалист в областта на екосистемните услуги и тяхното приложение в градското планиране.

Пълният текст на статията е наличен на адрес: <https://doi.org/10.3897/jbgs.e93499>



#### A review of regulating ecosystem services in the context of urban planning

Vanya Stoycheva <sup>1,\*</sup> , Davide Geneletti <sup>2</sup> 

<sup>1</sup> Department of Geography, National Institute of Geophysics, Geodesy and Geography – Bulgarian Academy of Sciences, Sofia, Bulgaria

<sup>2</sup> Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy

\* Corresponding author: vanya.e.stoycheva@gmail.com

##### Key words:

air quality, assessment methods, flood regulation, green infrastructure, literature review, local climate regulation, urban ecosystems

##### ABSTRACT

There is a high growing demand for regulating ecosystem services such as air quality regulation, regulation of air temperature and humidity, and flood regulation, in urban ecosystems which is important for urban planning. A comprehensive review of the current studies of the urban ecosystem, regulating ecosystem services, and their connection with urban planning actions is needed. The current paper presents such a review conducted in six stages to evaluate the state-of-the-art of regulating ecosystem services and their relationship with urban planning. It includes 58 papers selected after a precise keywords search and developed by publication screening, defining indicators, developing an assessment template, and meta-analysis of the results. The analyses are focused on spatial data used in the studies, the methods applied for ecosystem services assessment, and the relationships between regulating ecosystem services, urban planning, and green infrastructure. The most studied regulating ecosystem services within reviewed publications are *regulation of chemical composition of atmosphere and oceans, regulation of temperature and humidity, including ventilation and transpiration, and hydrological cycle and water flow regulation (including flood control, and coastal protection)*. Although urban planning-related papers are only 1/3 of the pool of papers, appropriate results have been obtained for assessing the urban planning-regulating ecosystem services relation. The review also identified some significant knowledge gaps that can be used as a starting point for future studies.

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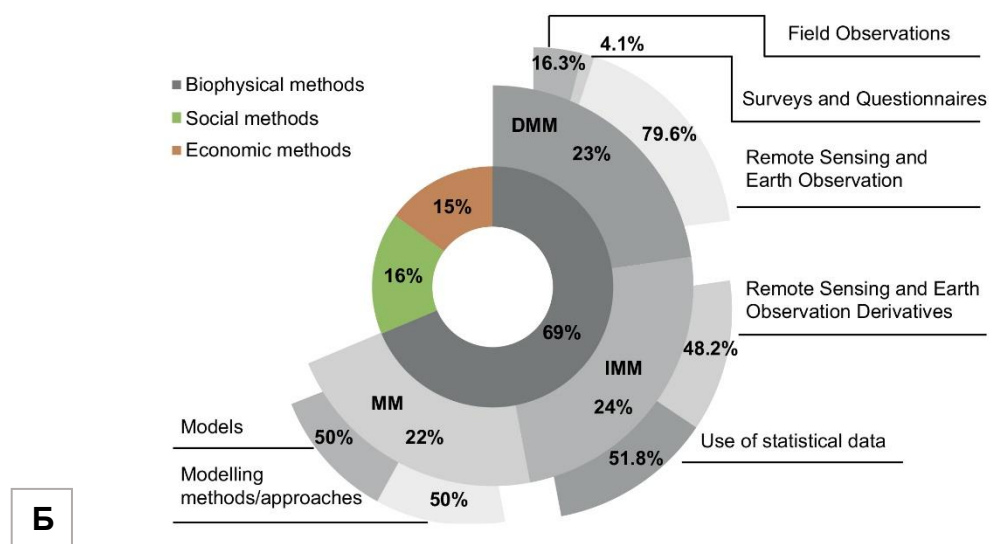


for the verification of remote sensing data and field surveys, face-to-face interviews and consultations with stakeholders.

Within indirect measurement methods, the most used one is the use of statistical data (51.8%). This is a result of the very high usage of hydrological, meteorological and other biophysical data, as well as population and other data for social-economic dynamic processes for generating statistical trends and using the data as input for running models.

The subgroup of modelling methods has an equal distribution of modelling methods/approaches (50%) and models (50%). Detailed of the used modelling methods will be described following RES in which they are used.

In the three most studied RES papers, all three biophysical methods are used in more than 69% of publications, as the most used are indirect measurement methods (IMM) (76% overall) (Fig. 13).



**Фигура 4.** Избрани акценти от статията (Stoycheva and Geneletti, 2023).

В резултат от работата по РП 5 „Екосистемни услуги“ и Дейност 5.2 „Разработване на интегриран подход за оценка на състоянието на екосистемите“ и 5.3 „Разработване на интегриран подход за оценка на СВЕУ“ е публикувана научна статия (Фиг. 5) представяща мониторинг на водния цикъл в карстовите геосистеми и възможностите за интеграция на свързаните с водите екосистемните услуги.

Пълният текст на статията е наличен на адрес: <https://doi.org/10.3897/jbgs.e101301>

## Monitoring of water cycle in karst geosystems and its integration into ecosystem assessment framework

Petar Stefanov , Hristina Prodanova \* , Dilyana Stefanova , Vanya Stoycheva , Gergana Petkova 

National Institute of Geophysics, Geodesy and Geography – Bulgarian Academy of Sciences, Sofia, Bulgaria

\* Corresponding author: hristina.zh.prodanova@gmail.com

### ABSTRACT

#### Key words:

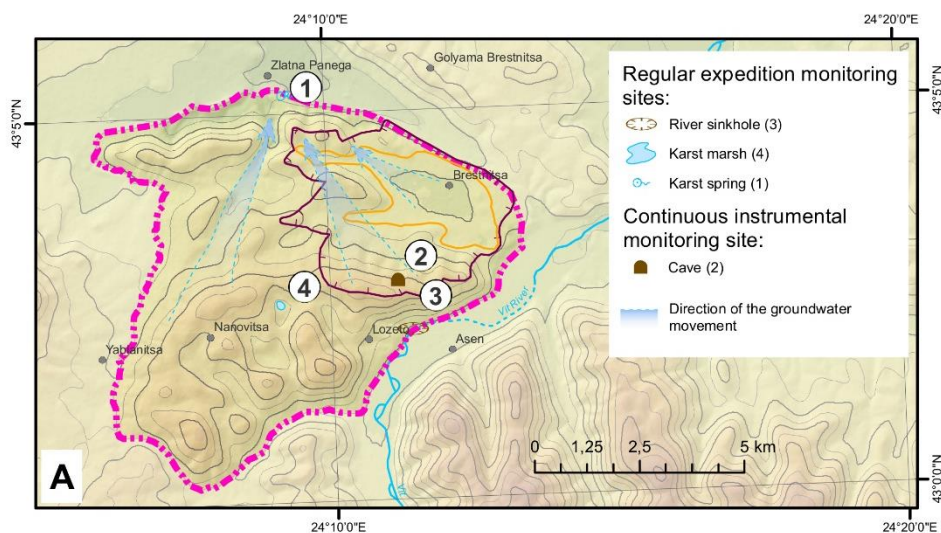
anthropogenic pressure, global changes, karst monitoring, microclimatic conditions, ProKARSTerra, regulating ecosystem services, soils

Karst is a widely spread natural phenomenon which provides essential benefits to human society, such as drinking water. The water cycle in the karst geosystems is the main factor for their formation and at the same time one of the main drivers for ecosystem services (ES) provision. The monitoring of the water cycle can provide valuable information regarding its functioning and ensure data for ES assessment. This paper aims to present an overview of the monitoring of the water cycle in the karst geosystems and the opportunities to integrate the monitoring data into the water regulation ES assessment. The monitoring of the water cycle is based on the methodological framework ProKARSTerra. It is applied in model karst geosystems, which are representative of the main karst types in Bulgaria. One of them is the Brestnitsa karst geosystem, which is the case study of this work. The monitoring ensures data for analyses of the water cycle which can be used in the assessment of water-related ecosystem services. The results from the analyses of the data requirements and availability show that some services such as *water flow regulation* and *regulation of chemical condition of freshwaters* can be easily provided through data for quantification, while for others further studies are needed. The results of the long-term integrated monitoring in Brestnitsa karst geosystem provide the foundation for important conclusions and models for the karst genesis and function under global changes and active anthropogenic pressure. Their integration into the assessment framework and mapping of ecosystem services is an essential step towards the development of models for sustainable use of natural resources in the karst areas.

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P. Stefanov et al. / Journal of the Bulgarian Geographical Society 48 (2023) 15–26



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Фигура 5. Избрани акценти от статията (Stefanov et al., 2023).

### 3. Доклади на конференции

Проект INES беше представен на събития на национално (II-ра географска конференция “GeoDecade 2020-2030”) и международно ниво (4-та европейска конференция на Ecosystem Services Partnership (ESP)).

#### 3.1. Доклади (презентации)

##### 3.1.1. Оценка и картиране на свързани с водите екосистемни услуги за природно-базирани решения в управлението на водите

Докладът (Фиг. 6), представящ работата по проекта, беше представен на II-ра географска конференция “GeoDecade 2020-2030” (13-15 септември 2022 г., гр. Шумен). Той е изготвен в съавторство на членовете на екипа, проф. д-р Стоян Недков, гл. ас. д-р Таня Тренкова, гл. ас. д-р Христина Проданова и докторант Ваня Стойчева.

Презентацията е достъпна на адрес: [https://inesproject.com/wp-content/uploads/2022/11/Geodecade\\_INES.pdf](https://inesproject.com/wp-content/uploads/2022/11/Geodecade_INES.pdf)



## 2. Защо изпълняваме този проект?



**Фигура 6.** Избрани акценти от презентация „Оценка и картиране на свързани с водите екосистемни услуги за природно-базирани решения в управлението на водите“.

### 3.1.2. Моделиране в ГИС среда на регулацията на наводнения за нуждите на екосистемните сметки

Докладът (Фиг. 7), представящ моделирането на регулацията на наводнения в ГИС за нуждите на екосистемните сметки беше представен на II-ра географска конференция “GeoDecade 2020-2030” (13-15 септември 2022 г., гр. Шумен). Той е изготвен в съавторство на членовете на екипа, проф. д-р Стоян Недков, докторант Десислава Христова, докторант Петър Николов, гл. ас. д-р Христина Проданова и докторант Ваня Стойчева.

Презентацията е достъпна на адрес: [https://inesproject.com/wp-content/uploads/2022/11/Geodecade\\_modeling\\_account.pdf](https://inesproject.com/wp-content/uploads/2022/11/Geodecade_modeling_account.pdf)





# Моделиране в ГИС среда на регулацията на наводнения за нуждите на екосистемните сметки



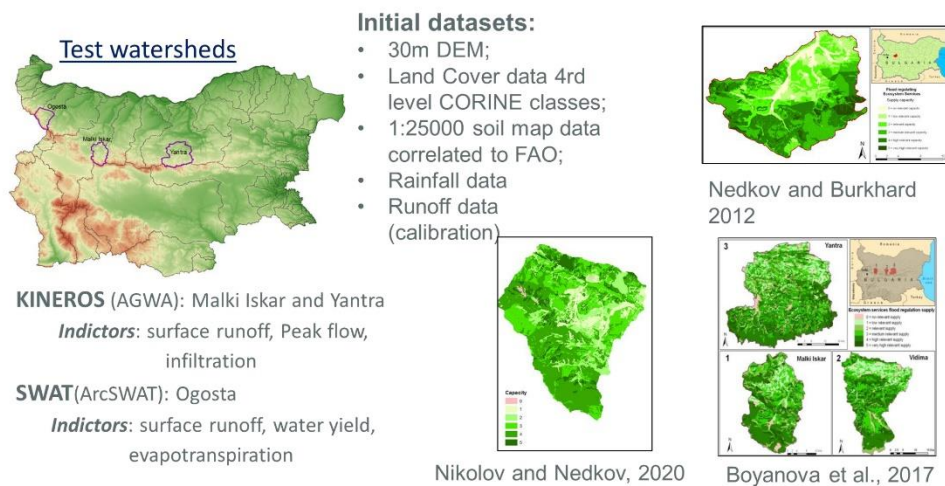
Стоян Недков, Десислава Христова, Петър Николов, Христина Проданова, Ваня Стойчева

Национален институт по геофизика геодезия и география – БАН

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## 3. Резултати от моделирането в тестови водосборни басейни



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13.9.2022 г.

Недков и др. Моделиране в ГИС среда на регулацията на наводнения за нуждите на екосистемните сметки

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**Фигура 7.** Избрани акценти от презентация „Моделиране в ГИС среда на регулацията на наводнения за нуждите на екосистемните сметки“.

### 3.1.3. Modeling of flood regulation for ecosystem accounting

Доклад на тема “Modeling of flood regulation for ecosystem accounting” (Фиг. 8) беше представен на 4th ESP Europe Conference (10-14 октомври 2022 г.) в Ираклион, Гърция. Той е изготвен в съавторство от проф. д-р Стоян Недков, докторант Десислава Христова, проф. д-р Марияна Николова, гл. ас. д-р Христина Проданова и докторант Ваня Стойчева.

Докладът е достъпен на адрес: [https://inesproject.com/wp-content/uploads/2022/11/ESP2022\\_S\\_Nedkov\\_et\\_al\\_Flood\\_account\\_work.pdf](https://inesproject.com/wp-content/uploads/2022/11/ESP2022_S_Nedkov_et_al_Flood_account_work.pdf)





# Modeling of flood regulation for ecosystem accounting



Stoyan Nedkov, Desislava Hristova, Mariyana Nikolova, Hristina Prodanova, Vanya Stoycheva



National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences;

11.10.2022

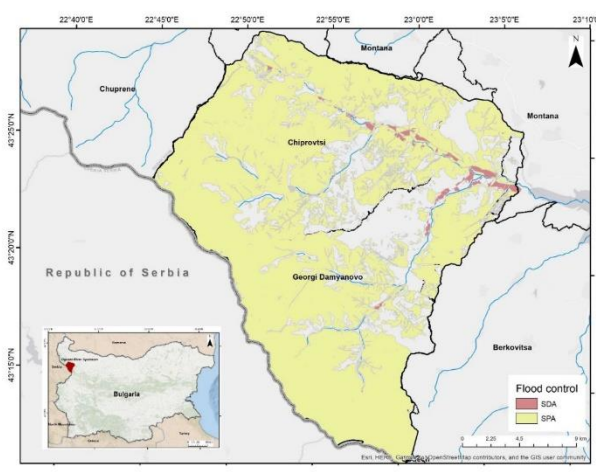


ECOSYSTEM SERVICES EMPOWERING PEOPLE AND SOCIETIES IN TIMES OF CRISES

A



## Case study Ogosta Accounting of mountain watersheds



SPAs are located evenly throughout the basin. They have a compact extent and form a continuous area from the south to the north in the higher part of the basin. More heterogeneous is their distribution in the lower parts of the basin especially downstream of the Dalgodelska Ogosta and the Chiprovska rivers. There are also SPAs in the floodplain especially downstream of the main river around the villages of Gorna Kovatchitsa and Belimel.

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OF THE BULGARIAN GEOGRAPHICAL SOCIETY

Modeling of flood regulation for ecosystem accounting: a case study of Ogosta river basin  
Petar Nikolov<sup>1\*</sup>, Desislava Hristova<sup>2</sup>, Vanya Stoycheva<sup>3</sup>

<sup>1</sup>National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences (NIGGG-ANS), Sofia, Bulgaria  
<sup>2</sup>Faculty of Geology and Geography, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria  
<sup>3</sup>Corresponding author: petar.nikolov@gmail.com

**Key words:** ArcSWAT, ecosystem services, MESA-EA, SDA, SPA

**ABSTRACT:** The System of Environmental-Economic Accounting – Ecosystem Accounting (MESA-EA) is a spatially-based, integrated statistical framework for organizing biophysical information about ecosystems, measuring ecosystem services (ES), water flow regulation ES and hydrological modeling are among the main topics in the individual ES part of the MESA-EA framework and flood regulation ES is one of the important services. Characterizing and assessing flood regulation is a challenging task as both assessment and accounts of this ES need various data which are usually not available through direct or indirect measurements, therefore modeling approaches of water regulation are much needed. Despite growing attention and studies using hydrologic models to assess and/or map flood regulation ES, the accounting of this service is still not well developed. In this paper, we present an approach for accounting flood regulation at a local scale.

Components	Ecosystem types					Total [ha]	Years assessed
	Cropland	Grassland	Sparsely vegetated land	Urban	Woodland and forest		
3300.69	5455.25	669.12	606.17	31648.51		2000	
3300.44	5455.20	669.14	606.46	31648.50		2006	
3285.47	5413.52	671.46	583.08	31726.25		2012	
3287.76	5651.72	632.16	582.64	31525.48		2018	
<b>ES Potential</b>	<b>3293.59</b>	<b>5493.92</b>	<b>660.47</b>	<b>594.59</b>	<b>31637.19</b>	41679.76	average
434.81	3.14	0.00	173.20	12.77		2000	
434.80	3.14	0.00	173.21	12.77		2006	
431.61	12.03	0.00	168.98	17.30		2012	
430.68	12.03	0.00	162.98	18.22		2018	
<b>ES Demand</b>	<b>432.98</b>	<b>7.59</b>	<b>0.00</b>	<b>168.09</b>	<b>15.27</b>	623.91	average
5.91	9.77	1.20	1.09	56.67		2000	
5.91	9.77	1.20	1.09	56.67		2006	
5.88	9.69	1.20	1.04	56.81		2012	
5.89	10.12	1.13	1.04	56.45		2018	
<b>ES Actual flow</b>	<b>5.90</b>	<b>9.84</b>	<b>1.18</b>	<b>1.06</b>	<b>56.65</b>	74.64	average

Фигура 8. Избрани акценти от доклад “Modeling of flood regulation for ecosystem accounting”.

### 3.1.4. Modeling of water-related ecosystem services for nature-based solutions in river basin management

Доклад на тема “Modeling of water-related ecosystem services for nature-based solutions in river basin management” (Фиг. 9) беше представен на 4th ESP Europe Conference (10-14 октомври 2022 г.) в Ираклион, Гърция. Той е изготвен в съавторство от проф. д-р Стоян Недков, гл. ас. д-р Христина Проданова, докторант Ваня Стойчева, проф. д-р Марияна Николова, докторант Десислава Христова, гл. ас. д-р Таня Тренкова и гл. ас. д-р Евгения Сарафова.

Докладът е достъпен на адрес: [https://inesproject.com/wp-content/uploads/2022/11/ESP2022\\_S\\_Nedkov\\_et\\_al\\_INES\\_NBS.pdf](https://inesproject.com/wp-content/uploads/2022/11/ESP2022_S_Nedkov_et_al_INES_NBS.pdf)

The image shows the cover of a report. At the top, there are four logos: a star-like logo on the left, a globe logo below it, the INES logo (a water drop with a leaf) on the right, and another globe logo below it. The title "Modeling of water-related ecosystem services for nature-based solutions in river basin management" is written in large green letters in the center. Below the title, the authors' names are listed: Stoyan Nedkov<sup>1</sup>, Hristina Prodanova<sup>1</sup>, Vanya Stoycheva<sup>1</sup>, Mariyana Nikolova<sup>1</sup>, Desislava Hristova<sup>1</sup>, Tanya Trenkova<sup>1</sup>, Evgenia Sarafova<sup>1,2</sup>. Below the names, the affiliations are given: <sup>1</sup> National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences; <sup>2</sup> Sofia University, Faculty of Geology and Geography. The date "14.10.2022" is centered below the affiliations. At the bottom of the cover, there is a banner with the text "ECOSYSTEM SERVICES EMPOWERING PEOPLE AND SOCIETIES IN TIMES OF CRISES" and a background image of a river valley with mountains and birds. Below the banner are five logos: a box with the letter 'A', the ESP logo (Ecosystem Services Empowering People and Societies in Times of Crises), the logo of the National Institute of Geophysics, Geodesy and Geography (Bulgarian Academy of Sciences), the logo for the 4th ESP Europe Conference, and the logo for Harokopio University Geography Department.

**Modeling of water-related ecosystem services for nature-based solutions in river basin management**

Stoyan Nedkov<sup>1</sup>, Hristina Prodanova<sup>1</sup>, Vanya Stoycheva<sup>1</sup>  
Mariyana Nikolova<sup>1</sup>, Desislava Hristova<sup>1</sup>, Tanya Trenkova<sup>1</sup>, Evgenia Sarafova<sup>1,2</sup>

<sup>1</sup> National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences;  
<sup>2</sup> Sofia University, Faculty of Geology and Geography

14.10.2022

ECOSYSTEM SERVICES EMPOWERING PEOPLE AND SOCIETIES IN TIMES OF CRISES

**A** **ESP** **4th ESP EUROPE CONFERENCE**

Regional forest management plans

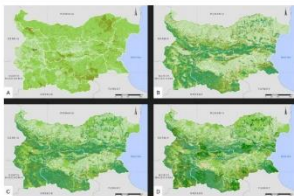


8 Social benefits from forest ecosystems

Social benefits from the forest areas:

- 1. Erosion and flood prevention;
  - 2. Water supply;
  - 3. Biodiversity maintenance;
  - 4. Visual screening and local climate regulation;
  - 5. Recreation and tourism;
  - 6. Traditional landscape;
  - 7. Maintenance of natural and cultural heritage;
  - 8. Protection of infrastructure;
  - 9. Global climate regulation.
- BG forest law (2011)

Natural heritage for recreation and tourism



15 priority ES

ES	Potential indicators	Methods tier 1	Methods tier 2	Methods tier 3
I	1. Capacity for provision of agricultural products; 2. Climatological conditions	1. Expert ass. by type/subtype		2. Climate/soil model
II	1. Capacity of the ecosystem to provide herbs and forest fruits; 2. Climate conditions	1. Expert ass. by type/subtype		3. Climate/elevation model
III	1. Capacity for provision of elec. energy; 2. Number of animals	1. Expert ass. by type/subtype	2. Statistics data	
IV	1. Capacity for provision of water; 2. Available water bodies; 3. Available underground water; 4. Available mineral water	1. Expert ass. by type/subtype		3-4. Spatial proxy
V	1. Capacity of the ecosystem to remove pollutants and other harmful substances; 2. Area presence; 3. Topography/vegetation analysis	1. Expert ass. by type/subtype	2. Statistics data	3. Spatial proxy
VI	1. Capacity for water flow regulation and flood protection; 2. Capacity for regulation of climate/biodiversity; 3. Area presence	1,3. Expert ass. by type/subtype	3. Statistics data	
VII	1. Capacity for habitat maintenance; 2. Biodiversity index; 3. Protected areas; 4. Protected sites and species	1. Expert ass. by type/subtype		3-4. Spatial proxy
VIII	1. Capacity of ecosystems for microclimate regulation; 2. LZC index	1. Expert ass. by type/subtype		2. LZC model
IX	1. Capacity of the ecosystem to provide space for recreation; 2. Biodiversity index; 3. Protected areas	1. Expert ass. by type/subtype		2,3. ESTMAP
X	1. Capacity of the ecosystem; 2. Number of publications; 3. Provision of environment for education activities	1. Expert ass. by type/subtype	2-3. Statistics data	
XI	1. Capacity of the ecosystem elements to provide material for local culture	1. Expert ass. by type/subtype		
XII	1. Aesthetic value of the ecosystem; 2. Number of photos	1. Expert ass. by type/subtype		2. InVEST
XIII	1. Symbolic value of the biotic elements; 2. Spiritual value of the biotic elements	1,3. Expert ass. by type/subtype		
XIV	1. Capacity of the ecosystem to provide space for recreation; 2. Water bodies; 3. Elevation	1. Expert ass. by type/subtype		2,3. ESTMAP
XV	1. Symbolic value of the abiotic elements; 2. Spiritual value of the abiotic elements; 3. Unique rocks	1,3. Expert ass. by type/subtype	3. Statistics data	

(Nedkov et al. 2021)

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**Фигура 9.** Избрани акценти от доклад “Modeling of water-related ecosystem services for nature-based solutions in river basin management”.

### 3.1.5. Crosswalking national classifications of Bulgaria to the IUCN-Global Ecosystem Typology

Доклад на тема “Crosswalking national classifications of Bulgaria to the IUCN-Global Ecosystem Typology” (Фиг. 10) беше представен на 4th ESP Europe Conference (10-14 октомври 2022 г.) в Ираклион, Гърция. Той е изготвен в съавторство от гл. ас. д-р Христина Проданова, Гергана Петкова, проф. д-р Стоян Недков и докторант Ваня Стойчева.

Докладът е достъпен на адрес: [https://inesproject.com/wp-content/uploads/2022/11/Prodanova-et-al\\_ESP\\_Europe\\_2022.pdf](https://inesproject.com/wp-content/uploads/2022/11/Prodanova-et-al_ESP_Europe_2022.pdf)

# Crosswalking national classifications of Bulgaria to the IUCN-Global Ecosystem Typology

Hristina Prodanova, Gergana Petkova, Stoyan Nedkov, Vanya Stoycheva  
National Institute of Geophysics, Geodesy and Geography - Bulgarian Academy of Sciences  
[hristina.zh.prodanova@gmail.com](mailto:hristina.zh.prodanova@gmail.com)

13 October 2022

ECOSYSTEM SERVICES EMPOWERING PEOPLE AND SOCIETIES IN TIMES OF CRISES

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HAROKOPIO UNIVERSITY  
GEOGRAPHY DEPARTMENT

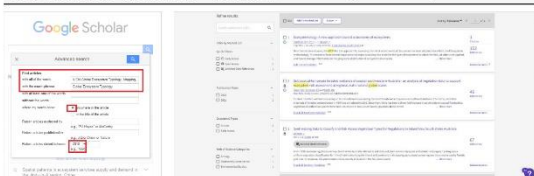
09/11/2022

Prodanova et al. Crosswalking national classifications of Bulgaria to the IUCN-Global Ecosystem Typology

10

## Literature review of GET-related studies

Data base	Date	Applied criteria	First result	After review
Google Scholar	09.06.2022	Marine-Terrestrial	295	24
Google Scholar	10.06.2022	Subterranean-Freshwater	53	13
Google Scholar	10.06.2022	Freshwater-Marine	394	67
Scopus	15.06.2022	Всички думи	182	32
Scopus	16.06.2022	IUCN GET	2	2
Web of Science	05.06.2022	Всички думи	223	47
Web of Science	07.06.2022	IUCN GET	3	3



- **With all of the words:** IUCN Global Ecosystem Typology, Mapping, Classification, Landscapes (all searches) + 1/4: Terrestrial, Marine, Freshwater, Subterranean;
- **With the exact phrase:** Global Ecosystem Typology

Б



HAROKOPIO UNIVERSITY  
GEOGRAPHY DEPARTMENT

**Фигура 10.** Избрани акценти от доклад “Crosswalking national classifications of Bulgaria to the IUCN-Global Ecosystem Typology”.

### 3.2. Постери

#### 3.2.1. Digitizing the landscape map of Bulgaria at a scale of 1:500 000 for the needs of ecosystem services assessment

Постерът на тема “Digitizing the landscape map of Bulgaria at a scale of 1:500 000 for the needs of ecosystem services assessment” (Фиг. 11), изготвен от Гергана Петкова и гл. ас. д-р Христина Проданова беше представен на 4th ESP Europe Conference (10-14 октомври 2022 г.) в Ираклион, Гърция (Petkova and Prodanova, 2022).

Постерът е достъпен на адрес: <http://dx.doi.org/10.13140/RG.2.2.35293.90087> и в сайта на проекта:






Poster session ID: 02-2 Biodiversity and ecosystem services in South-East Europe: Research challenges and application issues towards a community of practice

4th ESP EUROPE CONFERENCE 2022 10-14 OCTOBER 2022, IRAKLION, GREECE

Poster session, Wednesday 12 October 2022  
Topic of session: 02-2 15:30

## Digitizing the landscape map of Bulgaria at a scale of 1:500 000 for the needs of ecosystem services assessment

Gergana Petkova, Hristina Prodanova  
National Institute of Geophysics, Geodesy and Geography – Bulgarian Academy of Sciences (NIGGG-BAS), Sofia, Bulgaria  
Contact: hristina.zh.prodanova@gmail.com

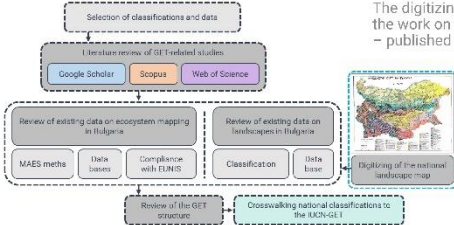


### Introduction

Landscape maps used in the Eastern European studies are the standard basis for characterizing the horizontal landscape structure, and the map's legend reflects the landscape classification (Tzvetkov 2020). These traditional multi-level landscape classifications, developed mostly in the XX-th century in Bulgaria, Russia, and other Eastern and Central European countries, could give valuable information for ecosystem services assessment (Prodanova 2021).

In this study, we demonstrate an application of the landscape classification of Beruchashvili et al. (1989) and the landscape map of Bulgaria at a scale of 1:500 000 (Todorov 2004) in ES assessment and mapping.

### Materials and methods



The digitizing of the landscape map is part of the work on WP4 of the INES project (Fig. 1) – published by Prodanova et al. 2022.

We used these spatial data to apply an experimental mapping at a national level in Bulgaria with the results from the assessments of the Natural Heritage to provide ES for development of recreation and tourism, which have been done within the project Heritage BG (Nedkov et al. 2021a, 2021b).

Figure 1. The place of the study within the WP4 of INES project.

**Фигура 11.** Избрани акценти от постер “Digitizing the landscape map of Bulgaria at a scale of 1:500 000 for the needs of ecosystem services assessment”

### 3.2.2. Regulating ecosystem services in urban ecosystems: a review in the context of urban planning

Постерът на тема “Regulating ecosystem services in urban ecosystems: a review in the context of urban planning” (Фиг. 12), с автори докторант Ваня Стойчева и проф. д-р Стоян Недков беше представен на 4th ESP Europe Conference (10-14 октомври 2022 г.) в Ираклион, Гърция (Stoycheva and Nedkov, 2022).

Постерът е достъпен на адрес: [https://inesproject.com/wp-content/uploads/2022/11/ESP\\_Europe\\_2022\\_Poster\\_Stoycheva\\_and\\_Nedkov\\_B10-3.pdf](https://inesproject.com/wp-content/uploads/2022/11/ESP_Europe_2022_Poster_Stoycheva_and_Nedkov_B10-3.pdf)

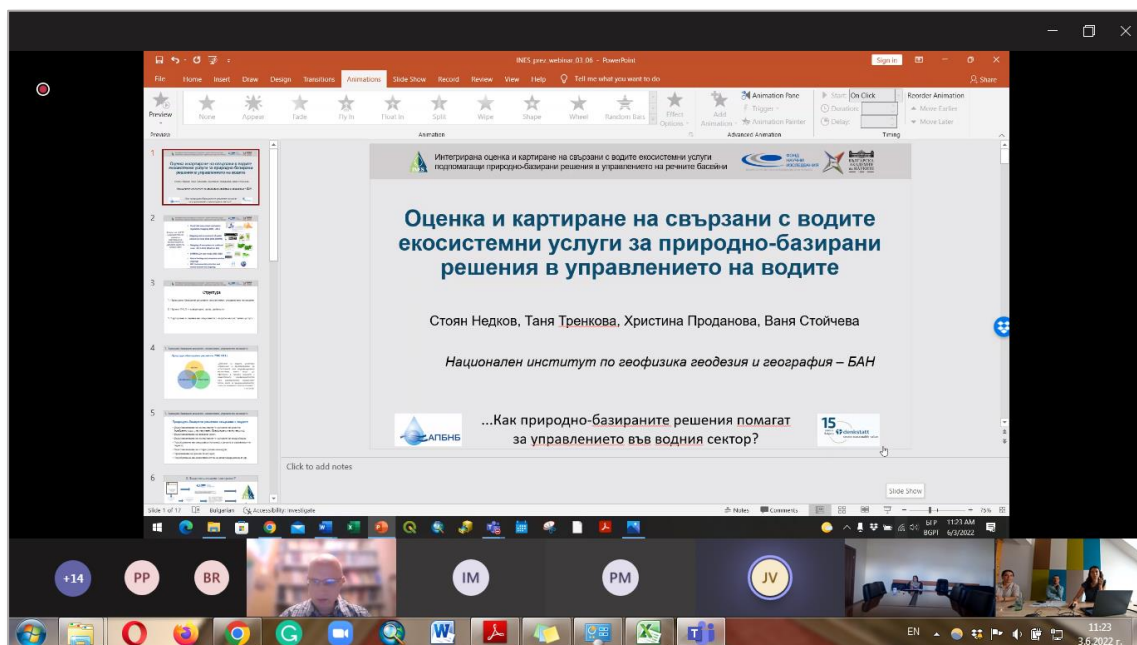




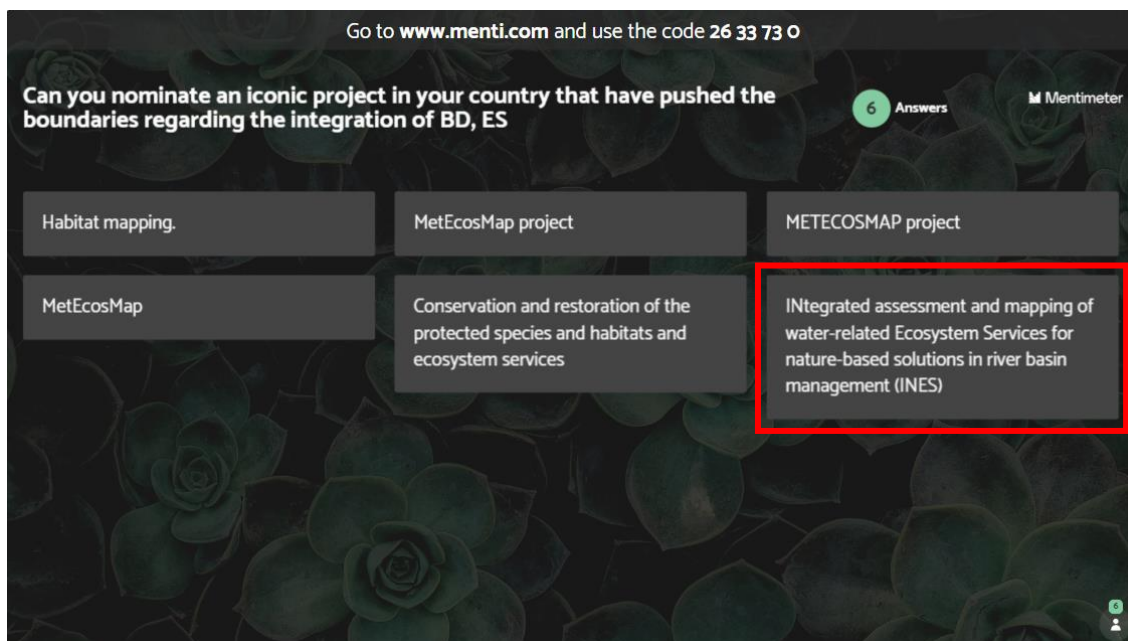
**Фигура 12.** Избрани акценти от постер “Regulating ecosystem services in urban ecosystems: a review in the context of urban planning”.

## 4. Други събития

Проектът беше представен и на други национални и международни събития. Те включват уебинар на Denkstatt България (Фиг. 13) за управление на водите (юни 2022 г.) и работна среща по проект SELINA (Фиг. 14).



**Фигура 13.** Представяне на проект INES на уебинар на Denkstatt България (03.06.2022 г.).



**Фигура. 14.** Представяне на проект INES на Workshop #1 (SELINA project) “Seeds of Change: understanding barriers, enabling factors, and decision makers’ needs triggering transformative change” (27-31.03.2023).

## 5. Заключение

През периода на първия етап на проекта, той е представен на редица национални и международни събития, което осигурява широката разпознаваемост на резултатите и екипа му.

Основните резултати от проекта (към 31.03.2023 г.) са публикувани в четири научни публикации и са представени на две национални и две международни събития под формата на доклади, постери и научна лекция.

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