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Session 3: Monetary valuation of ecosystem services (1)

Recreation ecosystem service, calculation of the contributions from different ecosystems

Kaia Oras (Statistics Estonia), Kätlin Aun (Statistics Estonia), Grete Luukas (Statistics Estonia), Üllas Ehrlich (Tallinn University of Technology), Aija Kosk (Tallinn University of Technology)

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Recreation-related ecosystem services – scope of the presentation

• Range of the service

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- Proposed quantification of the supply of the recreation ecosystem service (visits, time use)
- Allocation of the values to ecosystem types
- Comparison with one of the alternative service concept (based on accommodation statistics and ROS)
- Pros and cons of the method
- Other aspects to consider and way forward

Recreation-related ecosystem services – scope and definition

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- Service is broadly defined as characteristics of living systems that enable activities promoting and restoration health or enjoyment through active or immersive interactions (CICES v5.1).
- Service reveals itself through direct human contact with nature
- We narrowed the scope of recreation service as visits for recreational activities to registered recreation areas and trails.
- As a rule, people do not pay for staying in nature for recreational purposes, so for the valuation non-market valuation methods were applied.
- Some methods were considered (cost-based, time use, contingent valuation method, see slides in annex). Time use methods was preferred.

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Data

- Estonia has an extensive system of hiking/health trails and recreational areas.
- Majority of recreational sites are managed by two providers State Forest Management Centre (SFMC) and Estonian Health Trails Foundation - and are registered on their respective databases.
- Many of these trails are equipped with counters that give an indication of the number of visitors.
- The managers have estimated the total visits per year to the respected site/trail or over an area which includes several sites/trails.

=> DATA ON VISITATIONS TO LOCATIONS



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Treatment of data

- Data on recreational sites
 - fully geospatial;
 - some locations needed to be digitalized to get spatial objects.
- Point or polyline type of data was converted to polygons by creating buffer zones of up to 20 m.
- Buffers with radius of 500 m were created around the polygon objects to account for the environment that supports nature recreation service at the site but do not necessarily intersect with the site/trail directly.

• => SPATIAL DATA WITH VISITATION INFO



Monetary valuation: ecosystem service of recreation was valued by time use

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•		. VALUE OF THE SERVICE	=	number of visits	Х	time spent on visit and transportation	Х	monetary value of (leisure) time
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•						Sites by location:		Weused
•						urban or nature.		recommended value of
•		·		Site managers				time from Heatco*
•				have estimated				project plus one-third
•				sites		Urban: visit		due to GDP growth
•				Sites		0.5 11, transport 1 11.		during last ten years.
•	· · · · · ·	·				Nature: visit		Most often used in
•						2 h, transport 3 h.		cost-benefit analysis of
•								transport projects
•		•				All SEMC sites/trails are in		where time saving is
•	• • • • •					nature.		
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•								
•	•					Estonian Health Trails		
•	STATISTICS . ESTONIA	· ·				Foundation trails are both in nature and urban areas		

7 Monetary valuation: results

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	Number of visits, 2019, million	Time spent on visit and transportation (h)	Monetary value of leisure time (€/h)	VALUE of the service (million €)
SFMC trails in nature areas	2.6	5	6.5	84.5
Health Trails in nature areas	0.6	5	6.5	18.8
Health Trails in urban areas	3.3	1.5	6.5	32.2
TOTAL	6.5			135.5

Each category value was divided between the spatial objects in the category.

• The values were further allocated to all the ecosystem assets that intersect with the buffered site/trail object based on the share of total area of ecosystem assets.



The ecosystem service provisioning areas and values of recreation service



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The areas coloured from light to dark green represent service provisioning areas according to the unit value (€/ha) supplied by ecosystem assets that was found by valuation of time use. Areas coloured white represent areas (ecosystem assets) that do not supply the ecosystem service in the current scope of the service

Allocation to ecosystem types



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Results: supply and use tables of recreation service, 2019 (million €)

Ecosystem type	Recreation	Percentage
Forest	65.3	48.2
Grassland	13.5	10
Cropland	13.8	10.2
Wetland	21.8	16.1
Artificial area	9.0	6.6
Coast	0.9	0.7
Inland waterbodies	11.0	8.1
Other	0.1	0.1
Total supply	135.5	

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Economic activity and institutional sector	Recreation
Non-financial corporations	
Financial corporations	
General government	
Non-profit institutions serving households	
Households	135.5
Rest of the world	
Intermediate services between ecosystems	
Total use	135.5

Comparison with the alternative valuation and allocation method

- Method and definition in the amendment of regulation on environmental accounts (EU) No 691/2011:
 - "Nature-based tourism-related services are defined again as the ecosystem contribution, in particular through the biophysical characteristics and qualities of ecosystems, that enable people to use and enjoy the environment through direct, in-situ, physical and experiential interactions with the environment.

These contributions shall be reported in number of overnight stays in hotels, hostels, camping grounds, etc. that can be attributed to visits to ecosystems

- For isolation of the ecosystem contribution use Recreation Opportunity Spectrum (ROS) i.e presence of accessible and attractive ecosystems (developed by JRC).
- The service is then proposed to be spatially allocated to ecosystem types by the relative extent of ecosystem types according to **ROS**.
- This approach can easily generalize data.

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Nature-based tourism-related service supply based on overnight stays (in millions) with applied ROS (Recreation opportunity spectrum)

Step 1: Tourism statistics by degree of urbar	nization			
Estonia (EE0), 2018		Total stays	Reporting country	Foreign country
	Total	6.6	2.5	4.2
	Cities	3.7	0.7	3.0
	Towns and suburbs	1.3	0.6	0.7
	Rural areas	1.6	1.1	0.5
Step 2: Ecosystem contribution				
Default: presence of ecosystems. Recreation	n opportunity spectrum			
	% surface ROS categories 5-6-8-9	Total stays	Reporting country	Foreign country
Total	58%	3.9	1.4	2.4
		Percentage	58%	58%
Step 3: Ecosystem types (starting from defa	ult option step 2)			
Option 1: weighted distribution based on RO	S	Total stays	Percentage of total	
Supply				
Settlements and other artificial areas		0	0%	
Cropland		0	0%	
Grassland (pastures, semi-natural and natur	ral grassland)	0.36	9%	
Forest and woodland		2.72	70%	
Heathland and shrub		0.02	0%	
Sparsely vegetated ecosystems		0.001	0%	
Inland wetlands		0.31	8%	
Rivers and canals		0.01	0%	
Lakes and reservoirs		0.43	11%	
Marine inlets and transitional waters	0	0%		
Coastal beaches, dunes and wetlands	0.01	0%		
Marine ecosystems (offshore coastal shelf	and open ocean)	0	0%	
Use				
Exports		2.43	63%	
Household final consumption	1.43	37%		
Total		3.86		

Recreation service monetary supply based on visitation data

	Number of visits in millions, 2019
SFMC trails in nature areas	2.6
Health Trails in nature areas	0.6
Health Trails in urban areas	3.3
TOTAL	6.5

Ecosystem type	Recreation, million €	Percentage of total
Forest	65.3	48.2
Grassland	13.5	10
Cropland	13.8	10.2
Wetland	21.8	16.1
Artificial area	9.0	6.6
Coast	0.9	0.7
Inland waterbodies	11.0	8.1
Other	0.1	0.1
Total supply	135.5	

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Comparison of the distribution of the supply of recreation service by ecosystem types, %

Eurostat proposed methodology based on **overnight stays**: rather high number of visitations and also somewhat distorted distribution of the service supply.

According to methodology based on **visitation data: around half (48%)** of the recreation services could be attributed to forest ecosystems

while in case of modelling based on accomodation data around 70-80%.



Supply of the recreation service based on tourism-related service indicator

• The assumptions are the source of the problem:

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The indicator overnight stays includes the overnight stays in the cities (56%) but ROS accessible and attractive areas do not include settlements and their green areas

Due to this the number of overnight stays in cities are actually attributed to natural ecosystems outside the cities.

Conclusions

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- Pros of the methods based on visitation data
 - Straightforward method as it uses data on actual visitations and visited recreational areas.
 - Results reflect the actual supply of the service in the ecosystem types where it is used.
 - Requires some computational power and knowledge of GIS analysis, but much less than approaches that use distance modelling etc.
 - Visitation data already includes the info on the areas that visitors deem attractive or suitable for recreation and their accessibility.
- Cons of the methods based on visitation data
 - Detailed visitation data and spatial data on recreation areas may not be available.
 - It may underestimate the overall recreation service supply (depends on the definition of the service)
 - Monetary valuation methods are still under debate, however allocation method could be well applied also for physical service values

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Thank you!

Name

Kaia Oras, Üllas Ehrlich, Kätlin Aun, Aija Kosk, Grete Luukas E-mail

Kaia.oras@stat.ee

STATISTICS ESTONIA

www.stat.ee Tatari 51, 10134 Tallinn,

The work was based on the data produced in a frame of Eurostat grant 881542–2019-EE-ECOSYSTEMS, more details are described in the methodological report <u>"Development of the ecosystem accounts".</u>

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Annex Main applied monetary valuation methods for nature based recreation (2)

- Time use-based approach.
- Travel cost method widely used method; not tested.
- Cost-based approach
 - Expenditures incurred for establishment and maintenance of recreational infrastructure express society's willingness to pay for nature recreational services and are seen as proxy for the monetary value of recreational service.
- Contingent valuation methods
 - It is assumed that individuals are able to self-assess their well-being resulting from the consumption of non-market values.
 - Individuals' willingness to pay for ecosystem service(s) is inquired with a designated questionnaire.

	Time use (transport and visit), 2019	Expenditures (establishment and maintenance), 2018	Willingness to pay (incl. forests, wetlands, grasslands, urban), 2019
VALUE of recreation service (million €)	135.5	7.2	5.1

Annex Additional aspect for the nature recreation: recreational hunting

- The recreation-based ecosystem service of hunting is defined as the physical interaction of the hunter with the natural environment due to the presence of game in the said natural environment.
- Data

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- the number of hunters from hunting statistics,
- hunters' average yearly expenditures from a survey.
- Consumer expenditures were applied for the valuation of the service
 - Hunting is an activity that requires very specific equipment and licenses.
 - Hunters' expenditures made for hunting can be considered as a proxy value for the ecosystem service.

	Number of users of the hunting district, 2019	Annual average expenditure per hunter (€)	VALUE of the ecosystem service (million €)
Total expenditures	13 435	2608	35.0

• The beneficiaries and users of the service are households.

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Annex Recreational hunting: allocation to ecosystems

- Values were attributed to hunting districts based on the number of hunters in district.
- By overlaying the ecosystem base map with the hunting district map, we obtained the share (area) of each ecosystem type in the hunting district.
- Service values were divided between ecosystem types according to the obtained shares of ecosystem types per hunting districts.
- Values by ecosystem types were obtained by summing the individual values of ecosystem types in hunting districts.



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Monetary valuation: supply and use tables for recreational hunting service 2019 (million €)

Ecosystem type	Recreation	Recreational hunting
Forest	65.3	20.4
Grassland	13.5	5.1
Cropland	13.8	7.5
Wetland	21.8	2.0
Artificial area	9.0	
Coast	0.9	0.03
Inland waterbodies	11.0	
Other	0.1	0.05
Total supply	135.5	35.0

Economic activity and institutional sector	Recreation	Recreational hunting
Non-financial corporations		
Financial corporations		
General government		
Non-profit institutions serving households		
Households	135.5	35.0
Rest of the world		
Intermediate services between ecosystems		
Total use	135.5	35.0

Annex About main applied monetary valuation methods for nature based recreation (1)

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- The most widely used method for the economic evaluation of ecosystem recreational service is the travel cost method (e.g. Champ et al. 2003), which is based on the individual expenditures of the recreational service users. The limiting factor when using the travel cost method is that the consistent implementation of the method requires a large number of users of the recreational services to be interviewed.
- Another possible approach to find the value of a recreational service is time use based approach. This approach is based on the assessment of the monetary value of the time involved in using the service and assessing the monetary value of time for ecosystem service. The use of the time-based method requires the availability of data on the number of users of the recreational service and the time spent on using it. Both conditions are fulfilled for the current study and the method is applicable.
- A third option for estimating the economic value of a recreational service is a contingent valuation method based on a stated preferences, for which the necessary data is also available for use in current study.