Ecosystem accounts in Estonia (progress so far)

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Joint OECD-UNECE Seminar on the Implementation of the SEEA
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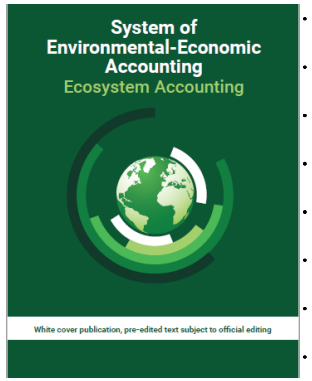
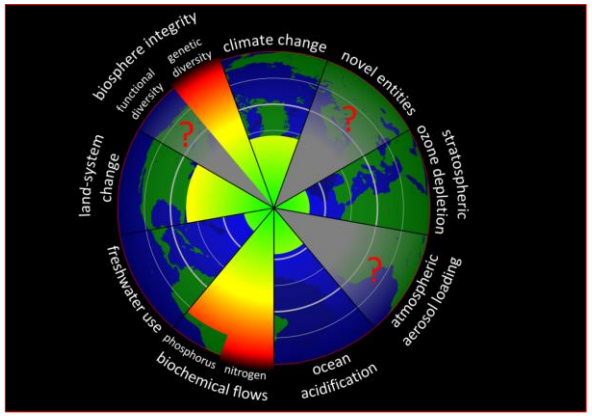
- Work is closely related and partly carried out under Eurostat grants 831254-2018-EE-ECOSYSTEMS, 881542 2019– EE-ENVECO and 2020-EE-ENVACC on ecosystem accounts

Which frameworks matter: ecosystem accounts in perspective





Planetary boundaries (Planetary boundaries - Wikipedia)

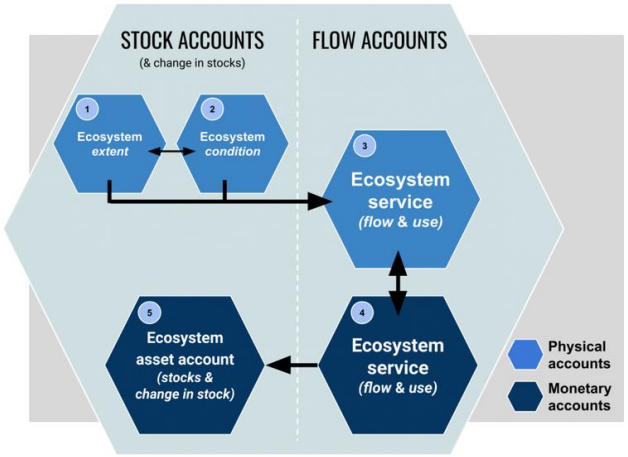
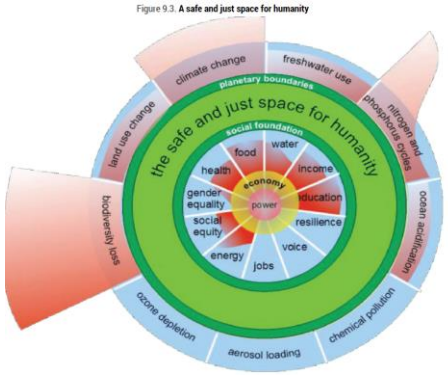


Figure 1: Ecosystem accounts and how they relate to each other

UN SEEA EA, https://seea.un.org/ecosystem-accounting



Political perspective 2. Beyond the boundaries on both sides: over the environmental ceiling – and under the social foundation. Source: Raworth, K. (2012) and Rockström, J. et al. (2009),

Political perspective 1. Sustainable Development Goals
Johan Rockström, Azote for Stockholm Resilience Centre, Stockholm University

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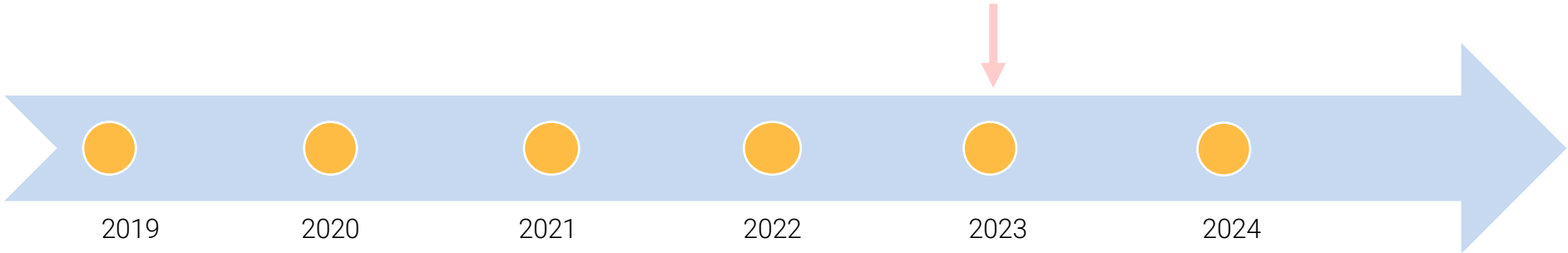
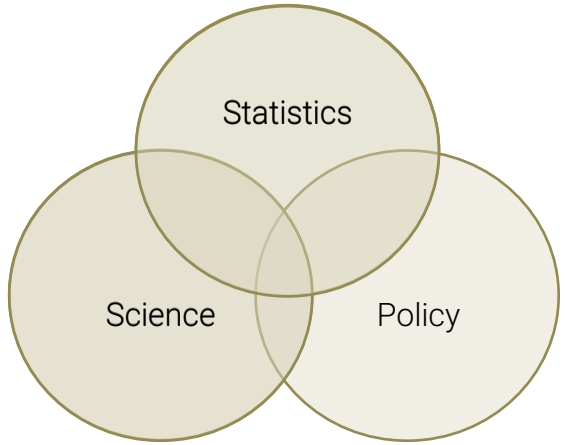
Timeline of the development UN SEEA ecosystem accounts in Estonia



2019	2020	2021	2022	2023	2024
Ecosystem extent account	Ecosystem extent account ownership perspective	Analyses of the publishing and visualisation	Timeseries of extent account	Timeseries of services	Regular production?
Grassland ecosystem services account test+ SUT	Services identification	Urban ecosystem account	Developing of the national system	Feasibility of condtion account	
	CVM		Indicators		
	Ecosystem classification and some testing of the IUCN grosswalk				



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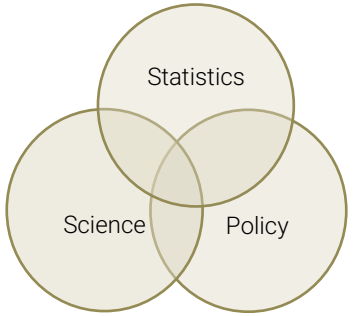
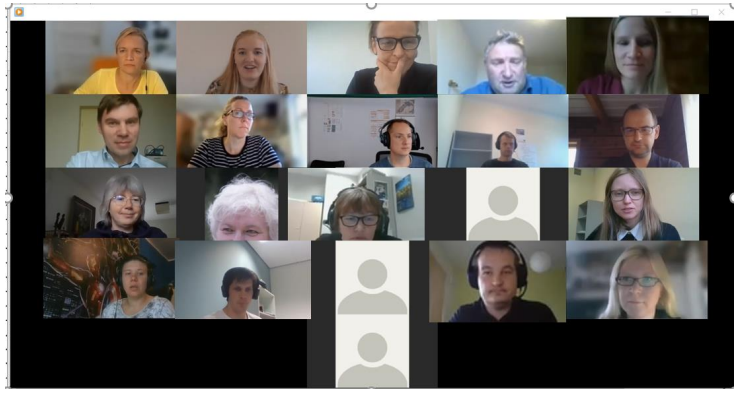
Co-operation has been crucial in initial steps but also later

- Team: statisticians and Tallinn Technical University experts
- Stakeholder consultations, interviews and seminars regarding the relevance of the services, methods for valuation, - trying to grasp best knowledge
- Consulting to learn but also to teach
- Participation in UN SEEA EA revision,
- UN London Group on Environmental Accounting,
- Eurostat Task Force on Ecosystem Accouns





Partners:

- Core: Tallinn Technical University (who are in lead of environmental economics in Estonia)
- Stakeholders and ohter partners: Environmental Ministry and Estonian Environmental Agency, MAES Implemention Team (Tartu University, Estonian University of life Sciences)

ECOSYSTEM EXTENT: compilation approach

TWO OPTIONS:

USE AND ADJUST EXISTING SPATIAL DATA (E.G. CORINE OR NATIONAL ECOSYSTEM MAP)

or

PREPARE A SPATIAL DATA SET ON THE BASIS OF A SET OF SOURCE MAPS (our current approach)

More is not always better…

Data is gathered/recorded for different purposes:

Inconsistencies in ecosystems boundaries.

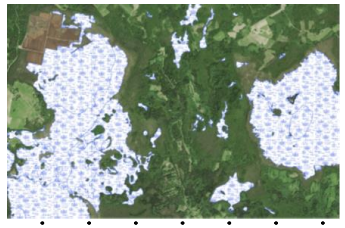
Data is gathered/recorded in different times:

Records are outdated

What is the actual state for older records is not know

Ecosystem extent account: registers based ecosystem map

ECOSYSTEM EXTENT ACCOUNT: register based ecosystem map

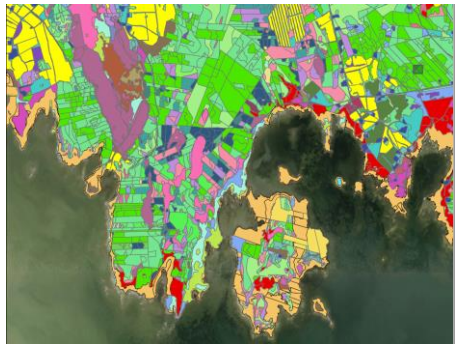


Merging different data layers into one layer
Decision tree and priorities to overlay the map layers:

1. Agricultural land and semi-natural habitats
2. Forests
3. Wetlands
4. Semi-natural habitats (eligible for support)
5. Natura 2000 habitats inventory
6. Meadows database
7. Estonian Topographic Database
   - gives 85% of EAA

For the remaining 15% of the area, Estonian Topographic Database was the only source of information we could use.

Ecosystem map:
Altogether ~3.8 million polygons
140 different mapping units
Ecosystem typology: EUNIS, national
crosswalk to IUCN (in progress) and EU ecosytem typology



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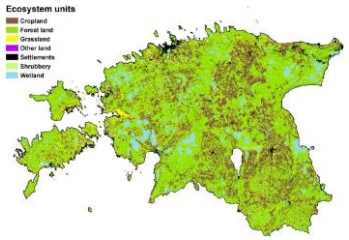
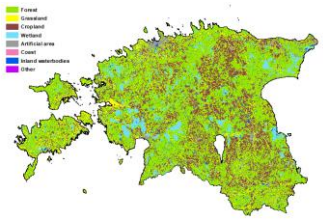
- https://unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.33/2020/mtg1/S4_3_ESTONIA_KAIA_ORAS.pdf

Ecosystem conversion matrix (2019-2020), ha

2019



2020



Opening area (km2)	Closing area (km2)																													
	Horticultural land	Green space	Buildings and other facilities	Abandoned peatlands	Drained peatland forests	Cultivated grassland	Mesotrophic boreal forests	Eutrophic alvar forests andshrublands	Fens	Reclamationed pits forest site type	Other	Other artificial areas	Heaths	Oligotrophic boreal heath forests	Oligo-mesotrophic boreal forests	Crops	Semi-natural grasslands	Shrubbery	Permanent crops	Peat bogs	Oligotrophic paludifying forests	Slopes	Menerotrophic swamp forests	Eutrophic boreo-nemoral forests	Mixotrophic and ambrotrophic bog forests	Lakes and ponds	Transition mires	Eutrophic paludifying forests	Peat extraction site	Rivers and streams	
Horticultural land	0	0.11	0.04	0	0.02	0.13	0.09	0	0	0	0	0.24	0	0	0.02	0.26	0.17	0	0.51	0	0	0	0.01	0.04	0	0	0	0.1	0	0	1.74
Green space	0.05	0	1.6	0	0.02	0.09	0.19	0.04	0	0.01	0	0.53	0	0	0.1	0.23	0.31	0.01	0	0	0	0	0.02	0.04	0	0.01	0	0.03	0	0.01	3.29
Buildings and other facilities	0.07	4.72	0	0	0.11	0.46	0.36	0.06	0.01	0.01	0	2.87	0	0.05	0.35	0.97	1.49	0.05	0	0	0.03	0	0.06	0.2	0	0.06	0	0.34	0	0	12.27
Abandoned peatlands	0	0	0	0	0.04	0	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0.09	0	0	0	0	0	0	0	0	0.02	0	0.16
Drained peatland forests	0	0	0.18	0.04	0	1.48	6.53	0.16	1.97	0.22	0.52	2.92	0	0.09	10.66	2.12	2.15	0.34	0.02	1	0.48	0	10.07	3.5	12.51	0.23	0.88	22.93	0.03	0.07	81.1
Cultivated grassland	0.08	0.12	0.61	0.01	1.49	0	4.12	0.46	1.07	0.02	0.06	4.32	0.01	0	0.96	170.56	29.37	0.63	0.27	0	0.01	0.01	0.21	1.85	0.06	0.15	0.02	3.77	0	0.13	220.37
Mesotrophic boreal forests	0.04	0.67	0.73	0	5.2	3.8	0	3.75	1.18	0.45	0.11	5.71	0	0.03	25.63	8.81	7.98	0.59	0.15	0.11	0.06	0.01	0.86	20.4	0.61	0.37	0.18	17.51	0	0.07	105.01
Eutrophic alvar forests andshrublands	0.01	0.13	0.09	0	0.38	0.33	9.38	0	0.45	0.31	0.03	0.89	0.01	0.14	0.36	0.42	4.25	0.15	0	0	0.01	0.03	0.33	0.89	0.04	0.06	0	5.02	0	0	23.71
Fens	0	0	0.05	0	2.63	1.03	1.06	0.22	0	0.02	0.68	1.27	0.27	0.02	0.45	0.43	12.37	0.27	0	0.2	0.03	0.01	3.02	0.56	1.8	0.19	2.87	3.38	0.01	0.04	32.88
Reclamationed pits forest site type	0	0	0	0.03	0.24	0	0.12	0.04	0.01	0	0	0.33	0	0.04	0.09	0.02	0.01	0	0	0	0	0	0.01	0.02	0.01	0.03	0	0.08	0.01	0	1.09
Other	0	0	0	0	0.09	0.06	0.1	0.04	0.17	0.01	0	5.47	0	0.02	0.04	0.01	0.38	0.07	0	0	0	0	0.04	0	0.01	0.01	0	0.33	0	0	6.85
Other artificial areas	0.2	1.61	3.99	0	1.61	3.64	4.62	0.5	0.36	1.03	1.57	0	0.01	0.12	2.52	8.04	11.84	0.68	0.09	0.05	0.19	0.13	0.33	1.69	0.21	0.58	0.03	4.05	0.01	0.14	49.84
Heaths	0	0.02	0	0	0.04	0.01	0.02	0	0.01	0	0.01	0.13	0	0.27	0.08	0	0.42	0	0	0.04	1.02	0	0	0	0.04	0	0	0	0	0	2.11
Oligotrophic boreal heath forests	0	0	0.03	0	0.06	0	0.16	0.03	0.02	0.01	0.01	0.09	0	0	4.61	0	0.04	0	0	0.12	0.37	0.1	0	0.01	0.17	0	0.04	0.15	0	0	6.02
Oligo-mesotrophic boreal forests	0.02	0.33	0.33	0	10.64	1.03	22.7	0.33	0.54	0.18	0.08	3.29	0.01	1.61	0	2.24	2.27	0.11	0	0.33	3.81	0.07	0.99	8.86	1.85	0.15	0.37	30.08	0	0.06	92.28
Crops	1.42	0.57	3.1	0	2.49	114.54	23.96	0.39	0.41	0	0.1	15.57	0	0.01	3.69	0	24.53	1.07	1.1	0.01	0.04	0	0.16	6.72	0.3	0.26	0.05	6.92	0	0.24	207.65
Semi-natural grasslands	0.08	1.3	2.77	0	3.65	32.94	16.5	2.1	7.77	0.06	0.77	11.02	0.34	0.06	3.99	20.46	0	3.07	0.14	0	0.02	0.62	1.04	7.94	0.37	0.72	0.16	17.18	0	0.55	135.62
Shrubbery	0	0.01	0.15	0	0.7	0.52	0.76	0.22	0.52	0.07	0.34	1.42	0	0.01	0.12	0.74	1.55	0	0	0.01	0	0	0.2	0.37	0.13	0.03	0.01	1.66	0	0.04	9.58
Permanent crops	0.5	0.02	0	0	0	0.22	0.06	0	0	0	0	0.12	0	0	0	1.04	0.05	0	0	0	0	0	0.01	0.02	0	0	0	0.05	0	0	2.09
Peat bogs	0	0	0	0.08	1.65	0	0.12	0	0.16	0.11	0	0.3	0.02	0.31	0.34	0	0	0	0	0	0.69	0	0.21	0.04	11.64	0.08	2.6	0.07	1.31	0	19.73
Oligotrophic paludifying forests	0	0	0	0	2.05	0.01	0.52	0.02	0.04	0	0	0.31	0	0.28	11.7	0.06	0.05	0	0	0.35	0	0	0.03	0.08	1.59	0.05	0.15	2.19	0	0	19.48
Shores	0	0.01	0.04	0	0.05	0.01	0.11	0.03	0.72	0	0.35	1.57	0.01	0.3	0.19	0	2.34	0.01	0	0	0	0	0	0.08	0	0.13	0	0.09	0	0	6.04
Menerotrophic swamp forests	0	0	0	0.01	17.99	0.23	1.33	0.1	1.01	0.22	0.06	0.48	0	0	1.32	0.22	1.15	0.22	0	0.08	0.05	0.01	0	0.51	2.49	0.02	0.24	8.87	0	0.05	36.66
Eutrophic boreo-nemoral forests	0.02	0.15	0.22	0	2.63	1.81	17.47	0.3	0.35	0.03	0.1	2.01	0	0.02	7.77	4.03	3.95	0.36	0.03	0	0.11	0	0.42	0	0.27	0.06	0.02	27.76	0	0.11	70
Mixotrophic and ambrotrophic bog forests	0	0.01	0.03	0.05	30.25	0.09	1.22	0.04	0.66	0.04	0.01	0.9	0	0.12	3.34	0.19	0.25	0.09	0.01	5.76	1.44	0	3.42	0.35	0	0.06	0.87	1.43	0.15	0	50.78
Lakes and ponds	0	0.06	0.07	0	0.15	0.13	0.22	0.05	0.57	0.04	0.05	0.85	0	0	0.13	0.19	0.67	0.28	0	0.1	0	0	0.09	0.02	0.03	0	0.7	0.19	0	0.02	4.61
Transition mires	0	0	0	0	1.13	0.03	0.15	0.01	2.33	0	0.04	0.12	0	0.03	0.32	0.02	0.1	0	0	2.86	0.15	0	0.4	0.05	2	0.08	0	0.27	0	0.01	10.1
Eutrophic paludifying forests	0.02	0.16	0.49	0	24.52	3.72	24.35	2.79	2.17	1.15	0.55	7.41	0	0.05	36.66	5.48	9.9	1.05	0.02	0.05	1.07	0.02	6.07	41.54	1.23	0.18	0.49	0	0	0.14	171.28
Peat extraction site	0	0	0	1.73	0.09	0	0.02	0	0	0.05	0	0.14	0	0	0	0	0	0	0	0.21	0	0	0.02	0	0.12	0	0	0.01	0	0	2.39
Rivers and streams	0	0.02	0.04	0.01	0.07	0.11	0.05	0.01	0.07	0	0.05	0.2	0	0.01	0.08	0.17	0.51	0.03	0	0.01	0	0	0.02	0.16	0.01	0.06	0.02	0.13	0	0	1.84
TOTAL	2.51	10.02	14.56	1.96	109.99	166.42	136.29	11.69	22.57	4.05	5.49	70.48	0.68	3.59	115.52	226.71	118.1	9.08	2.34	11.38	9.58	1.01	28.04	95.94	37.49	3.57	9.7	154.59	1.54	1.68	1386.5

Next steps concerning extent account

- Compile ecosystem extent account for 2021 (ongoing)
- Testing Eurostat questionnaire (guidance note) (finished)
- Automate at least some of the steps in compiling the account in sense of using either Phyton or R (foreseen in next grant)
- Cooperation with ohter actors in area

LULUCF

EUNIS

IUCN GET

EU Ecosystem classification

Ecosystem classification

- Ecosystem base map is compiled using different data from different data sources.
- Crosswalks to

  IPCC land use classes (**LULUCF**)

  EUNIS habitat classification were done in previous project (2019).

- **Multi-level national classification** was developed:
  - has details on the lowest level;
  - Is easily incorporated/crosswalked into global classification (**IUCN GET**), be comparable and representative.
  - allows the crosswalk to EU Ecosystem classification

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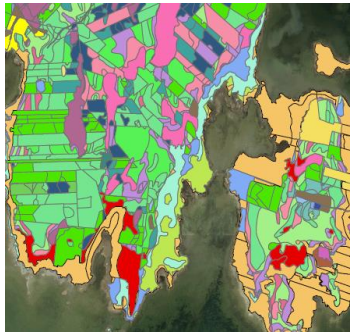
Ownership dimension of Estonian ecosystem extent account

Ecosystem map



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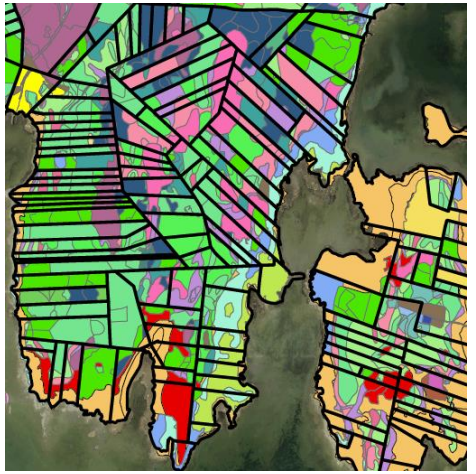
Land Cadastre

+

Statistical enterprise register

Ecosystem base map, Land Cadastre and statistical enterprise register data provided a basis for the creation of the ownership dimension in a merged dataset.

Merged dataset

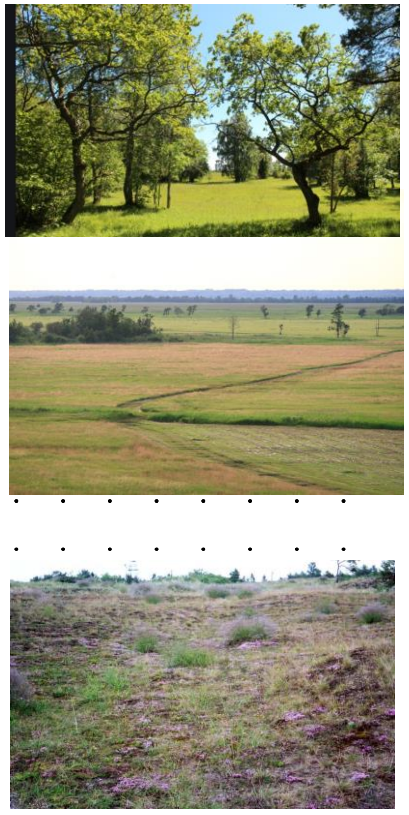


Opening extent account 2019, EUNIS Habitat classes and institutional sectors, ha

Institutional sector/ EUNIS ecosystem classification	General government	Corporations	...of which State Forest Management Centre	Households	Rest of the world	Un-known	TOTAL
Coastal	632	1556	1 353	644	190	65	2 997
Constructed, industrial and other artificial habitats	55 190	33558	8 794	80 072	2 498	3 259	176 577
Grasslands and lands dominated by forbs, mosses or lichens	29 224	67413	29 091	110 059	3 805	2 056	212 556
Habitat complexes	5 739	4900	1 926	9 343	457	178	20 618
Heathland, scrub and tundra	3 333	5027	[illegible]	[illegible]	[illegible]	189	19 370
Inland surface waters	11 354	21603	18 753	6 712	185	1 242	41 095
Inland vegetated or sparsely vegetated habitats	19 420	27300	10 551	19 874	591	1 709	69 894
Marine	2 439	7576	[illegible]	[illegible]	1 197	132	20 507
Mires, bogs and fens	17 413	208592	201 043	15 606	536	19 281	261 428
Regularly or recently cultivated agricultural, horticultural habitats	103 232	323761	6 393	661 207	8 377	5 705	1 102 284
Woodland, forest and other wooded land	113 178	1328812	1 049 105	680 055	15 654	81 392	2 419 091
NA	202	464	303	357	15	23	1 062
TOTAL	361 356	2232562	1 334 720	1 603 376	33 954	115 232	4 346 480

More detailed levels are available in both dimensions

How could the ecosystem extent account be of help for targeting of the measures for management of seminatural grasslands?



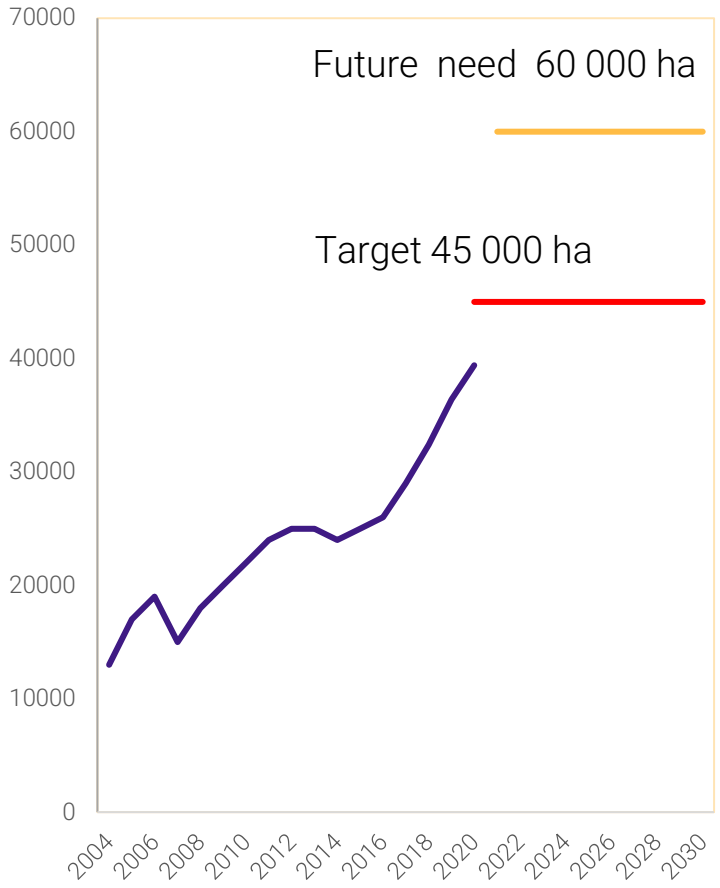
Goals set by Nature Conservation Development Plan (NCDP) need **targeted measures**.

In order to design the measures, we need to know the owners of the land where valuable/managed ecosystem reside.

Owners dimension Is not readily available but could be and was created.

Yes, ecosystem accounts could be of help if they are based on data of up to date registers

Area of managed semi-natural grasslands, target and progress, ha



*- Semi-natural grasslands are heterogeneous biodversity rich group of ecosystems which need conservation measures. In our latitude (natural conditions of temperate climate) they exist if managed regularly. Otherwise they will naturally convert into shrubberies and later into forest ecosystems. On the other hand semi-natural grasslands can be turned into intensively managed grasslands (including ploughing, sowing, monoculture creation, pesticide and fertilizer use) or arable land. Grasslands can also be converted into urban areas.

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How the data of ecosystem extent of seminatural grasslands could be used, 2019*

Ecosystem type	Code	AREA, ha	Management status, ha			Ownership, ha								
		hectars	To be managed according to the target	Managed	Additional need	Financial corporations	General government	Households	Hoseholds as physical persons	Non financial corporations	NPISH	Rest of the world	State Forest Management Centre	Unknown
Grassland		**498 505**	n.t.	n.r.	n.r.	**263**	63 176	**176 876**	114 272	91 933	1 576	**7 780**	**39 261**	**3 369**
Semi-natural grassland		241 953	n.t.	n.r.	n.r.	166	32 102	89 241	36 284	39 707	1 015	5 382	35 830	2 225
Semi-natural grassland, NATURA classification		**97 044**	43100	37500	8930	**62**	**8 950**	**29 419**	**13 646**	**11 140**	**430**	**3 104**	**29 402**	**892**
Boreal baltic coastal meadows	1630	19 946	10800	11891	a	19	2 339	6 384	2 681	1 901	121	1 191	5 195	116
Fixed coastal dunes	2130	397	n.t.	n.r.	n.r.		45	76	15	29	1	9	221	2
Dry sand heaths	2320	43	n.t.	n.r.	n.r.		8	18	7	3	0	6	1	0
Inland dunes	2330	27	n.t.	n.r.	n.r.		1	0	0	2	0		24	0
European dry heaths	**4030**	**561**	**290**	**57**	**233**	0	**208**	124	37	32	0	6	**154**	1
Juniperus communis formations on heaths	**5130**	**3 837**	**500**	**473**	**27**	7	151	**1 898**	657	346	26	249	471	32
Xeric sand calcareous grasslands	6120	32	n.t.	n.r.	n.r.		1	19	3	0	0	9		0
Calaminarian grasslands	6130	0	n.t.	n.r.	n.r.		0	0	0	0	0			0
Semi-natural dry grasslands and scrubland	6210	5 381	2420	2487	a	9	419	1 968	998	715	27	241	974	29
Fennoscandian lowland grasslands	**6270**	**6 175**	**1880**	**1534**	**346**	4	440	**2 320**	1 303	808	28	155	1 055	63
Nordic alvars	**6280**	**14 616**	**7700**	**5161**	**2539**	10	955	**5 826**	2 035	2 257	63	711	2 712	48
Molinia meadows	6410	3 693	650	710	a	0	154	895	366	504	5	113	1 636	19
Hydrophilous tall herb fringe communities	6430	3 641	370	1214	a	2	455	944	470	565	19	32	1 135	19
Northern boreal alluvial meadows	**6450**	**25 811**	**12200**	**8975**	**3225**	2	2 321	4 250	2 275	2 570	74	122	**13 735**	462
Lowland hay meadows	6510	5 348	1340	2587	a	7	877	1 896	915	706	47	80	750	70
Fennoscandian wooded meadows	**6530**	**4 569**	**3300**	**1169**	**2131**	0	433	**1 685**	916	509	16	118	872	20
Fennoscandian wooded pastures	**9070**	**2 965**	**1650**	**1221**	**429**	1	144	**1 117**	**969**	192	3	63	466	11
Other natural grassland		**144 908**	n.t.	n.r.		105	23 152	59 822	22 638	28 567	586	2 278	6 428	1 333
Cultivated grassland		256 552	n.t.	n.r.		97	31 074	87 634	77 988	52 226	561	2 398	3 431	1 144
Permanent grassland		256 552	n.t.	n.r.		97	31 074	87 634	77 988	52 226	561	2 398	3 431	1 144
Environmental non-sensitive permanent grassland		**255 998**	n.t.	n.r.		97	31 016	87 471	77 813	52 141	561	2 385	3 371	1 144
Environmental sensitive permanent grassland		**554**	n.t.	n.r.			58	163	175	86	0	12	59	0

AREA OF GRASSLANDS BY ECOSYSTEM TYPES.

Semi-natural grassland ecosystems types (NATURA) are highlighted with green shading

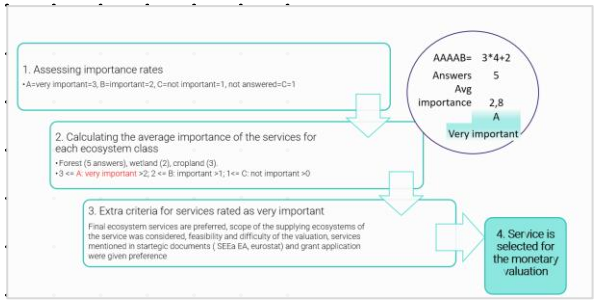
*-It should be noted that data on grassland ecosystem extent account are still in revision

MANAGEMENT STATUS:
„TO BE MANAGED BY 2030
„Managed" - currently managed
„Additional need" - area of semi-natural grasslands still to be managed: for wooded meadows, alluvial meadows and Nordic alvars area to be managed is remarkable.

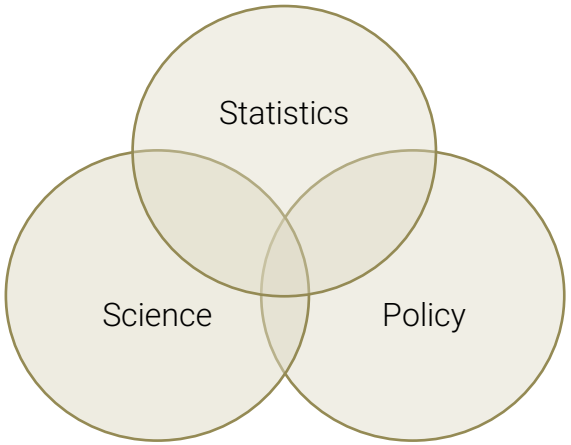
„OWNERSHIP, HA", arrows indicate the biggest ownership categories
Dry heaths (marked with lilac arrow) are owned in majority by government
Big share of wooded meadows and alvars (marked with blue arrows) are owned by households.
Alluvial meadows (marked with brown arrow) are managed by State Forest Management Centre (SFMC) in large

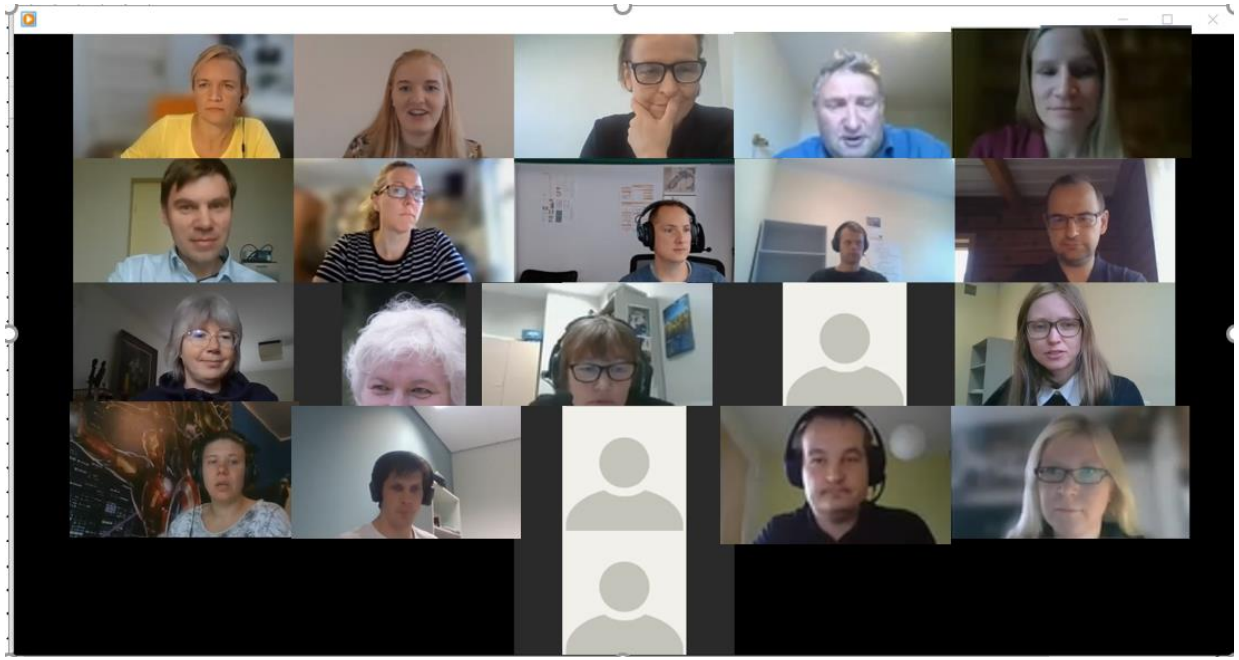
Ecosystem services

Valuation of ecosystem services



- Criteria for the selection of the ecosystem services:
  - Relevance and stakeholders' interest (questionnaires, discussions);
  - Data availability and suitable valuation methods, regular production;
  - Feasibility (consultations with experts).





STATISTICS ESTONIA

Valuation methods of ecosystem services

	Ecosystem services	Data sources	Exchange value based methods	CVM studies			
				forest	wetland	grassland	urban
PROVISIONING SERVICES	Fodder	Agriculture statistics	Rent price			x	
	Medicinal herbs	Literature		x	x	x	
	Herbaceous biomass for bioenergy	Energy statistics	Market price				
	Agricultural production (crops)	Agriculture statistics	Rent price				
	Wild berries, mushrooms	Estonian Social Survey, literature	Market price	x	x		
	Wild game	Hunting statistics	Market price				
	Timber	Forest data (Environment Agency)	Stumpage price				
	Peat	Balance sheet of mineral resources	Market price				
	Forest seed	SFMC (State Forest Management Centre) data	Market price	x	x	x	
	Organic waste used for compost (urban)	Literature	Market price				
REGULATING AND MAINTENANCE SERVICES	Flood protection					x	
	Global climate regulation: carbon sequestration, carbon storage	National Inventory Report of greenhouse gas emissions, literature	Payment for Ecosystem services (PES) scheme	x	x	x	x
	Air quality (PM_x)	Literature (UK survey)	Avoided damage, benefit transfer	x	x		x
	Pollination	Agriculture statistics, literature	Avoided damage	x		x	
	Maintenance of soil fertility			x		x	
	Habitat conservation for biological species			x	x	x	x
	Water infiltration (urban)	Weather data	Replacement cost				
	Regulating microclimate (cooling, wind)						x
	Noise mitigation						x
CULTURAL SERVICES	Recreation	Queries (SMFC, Health Trails)	Time use based	x	x	x	x
	Recreational hunting	Hunting statistics	Expenditure-based				
	Nature education	Queries (nature study programmes)	Expenditure-based	x	x	x	x
	Ensuring landscape diversity			x	x	x	x
	Aesthetic experience						x

Blueberry

Cranberry

Lingonberry

STATISTICS ESTONIA

EXAMPLE: provisioning service, wild berries

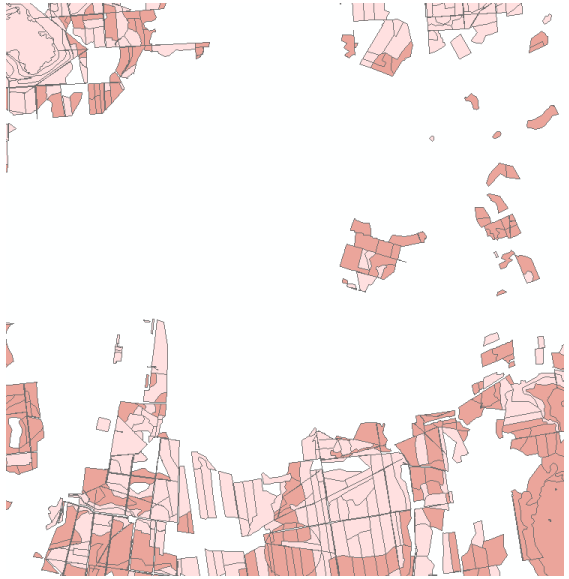
- Data for the quantity of gathered wild berries and mushrooms from Estonian Social Survey which collects data about household consumption of wild berries and mushrooms.

- The market price method was applied:
  quantity of berries and mushrooms is multiplied with the average market price
- The yearly average market price of most common berries and mushrooms were calculated separately based on weekly reports of produce prices on major markets.

Household consumption, 2019 (kg)	Average price 2019 (€/kg KM-ta)	Household consumption (€)	The value of the sold yield (4% household consumtion (€)	Total (€)
1 231 000	4.6	5 663 000	236 000	5 900 000

EXAMPLE

Provisioning service, wild berries, map view



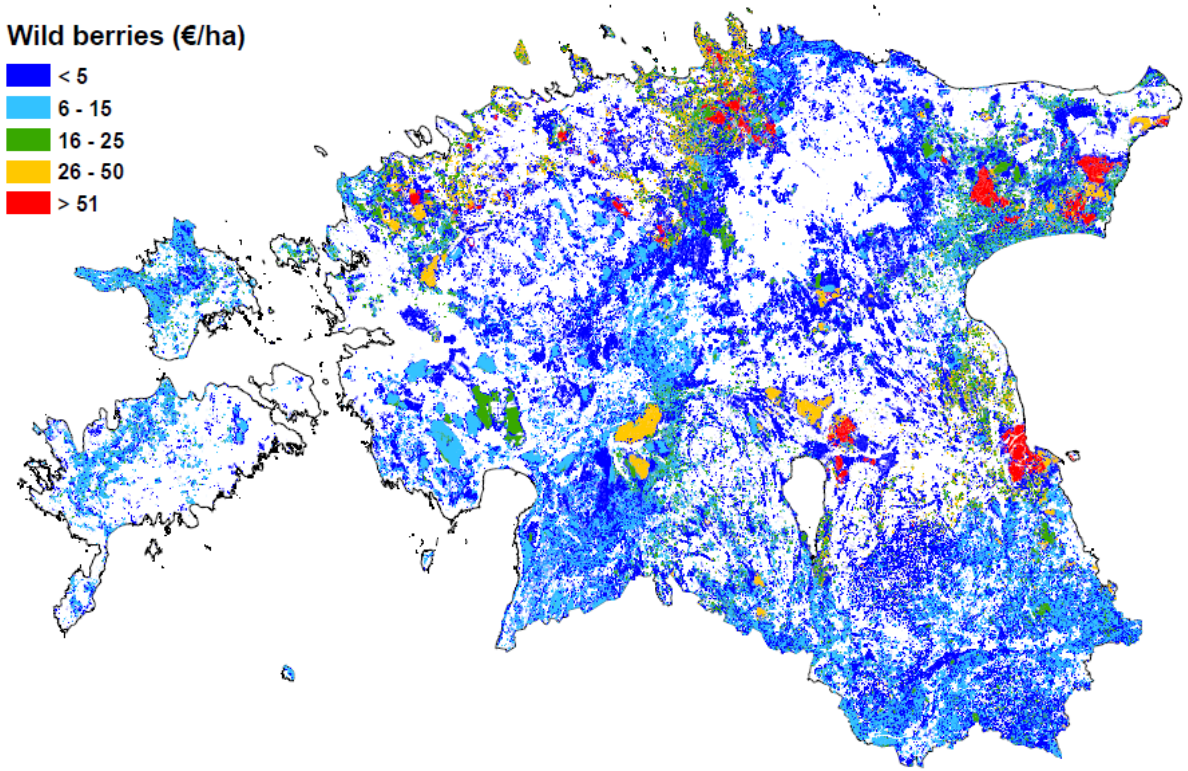
Spatial allocation of the monetary value of berries was based on the potential supply i.e average combined yield of bilberry, lingonberry and cranberry which data was obtained from the Project ELME*.

*Projekt ELME – „Elurikkuse sotsiaal-majanduslikult ja kliimamuutustega seostatud keskkonnaseisundi hindamiseks, prognoosiks ja andmete kättesaadavuse tagamiseks vajalikud töövahendid” (projekt nr 2014-2020.8.01.16-0112;

kaasrahastajad Euroopa Liidu Ühtekuuluvusfond ja SA Keskkonnainvesteeringute Keskus)

EXAMPLE

Provisioning service, wild berries, map view



First the service value by 15 counties was calculated

Spatial allocation of the monetary value of berries was further refined by the potential supply i.e average combined yield of bilberry, lingonberry and cranberry which data was obtained from the Project ELME*.

STATISTICS ESTONIA

*Projekt ELME – „Elurikkuse sotsiaal-majanduslikult ja kliimamuutustega seostatud keskkonnaseisundi hindamiseks, prognoosiks ja andmete kättesaadavuse tagamiseks vajalikud töövahendid" (projekt nr 2014-2020.8.01.16-0112; kaasrahastajad Euroopa Liidu Ühtekuuluvusfond ja SA Keskkonnainvesteeringute Keskus)

EXAMPLE

Regulative service , pollination, method, datasources

- Crop pollination ecosystem service value is „ the increased crop production of pollinator-dependent crops“ which is supplied by the wild pollinators.
- Avoided cost method was applied:
  - Based on the pollination dependence of crops and the distances between crop fields and pollinator habitats, the increase in crop yield for each field was calculated and then distributed to supplying ecosystem types.
- Data used: crop yields by county, basic unit prices of agricultural crop products from agriculture statistics, crop field map, ecosystem unit map.
- For each field, the potential yield increase due to pollination was calculated based on the need for pollination of the crop and the distances between the habitats of the pollinators and the fields. The resulting value was in turn distributed among the ecosystems providing the service.

STATISTICS ESTONIA

EXAMPLE

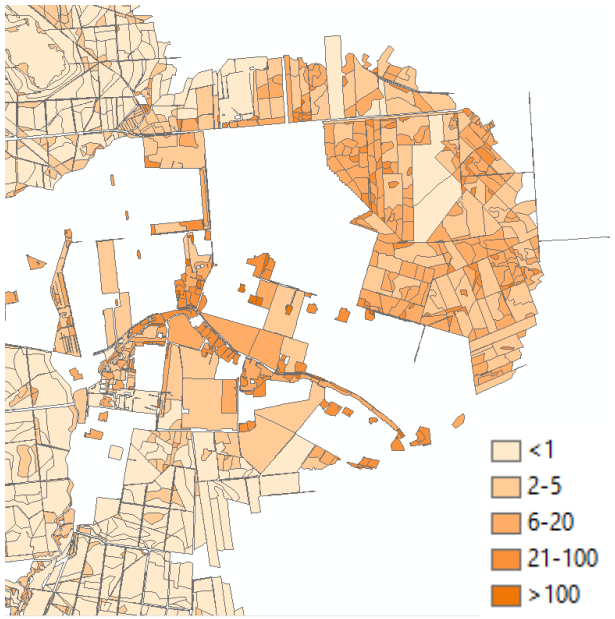
Pollination, distribution between the ecosystems

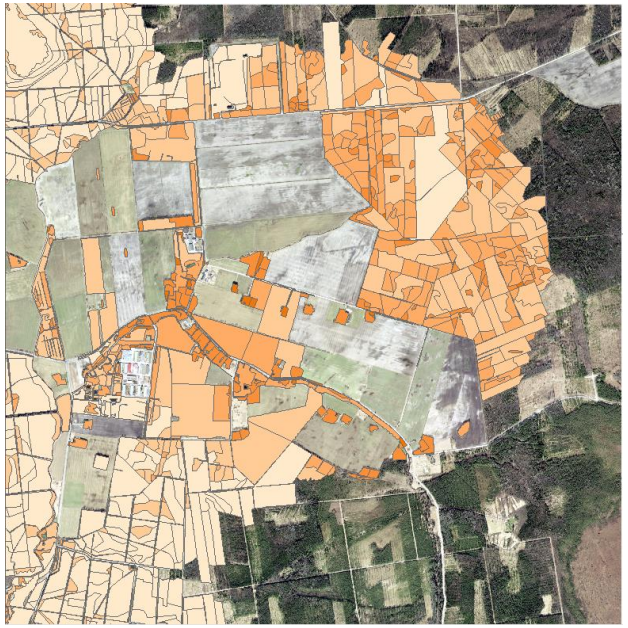
the value of the increased yield in crop production

due to the pollination from pollinator habitats.

is attributed to the ecosystems that are suitable pollinator habitats

based on spatial modelling.





	Forest	Grassland	Cropland	Wetland	Artificial area	Coast	Other	Total supply
Service value of pollination, 2019, mln €	13.10	10.71	0.62	0.10	6.58	0.001	0.01	31.13

STATISTICS ESTONIA

STATISTICS ESTONIA

Experimental: valuation of ecosystem services

Supply table of ecosystem services – exchange values, thousand €

Ecosystem service/ecosystem type	Forest	Grassland	Cropland	Wetland	Artificial area	Coast	Inland water-bodies	Other	Total supply
Total	549 610	45 371	70 298	61 407	18 397	997	11 612	240	758 048
Provisioning services – total	362 003	13 618	45 293	35 911		9		12	456 846
Fodder		12 302	11 266						23 568
Agricultural production (crops)			32 273						32 273
Herbaceous biomass used for energy		46	88						134
Wild berries and mushrooms	18 021	5		552					18 578
Wild game	5 263	1 265	1 667	496		9		12	8 712
Timber	338 602								338 602
Peat				34 863					34 863
Forest seed	116								116
Regulating services – total	97 769	12 060	2 815	767	7 100	1		24	120 536
Global climate regulation: carbon sequestration	78 340								78 340
Air quality regulation	6 325	1 351	2 193	668	522			10	11 068
Pollination	13 104	10 709	622	99	6 579	1		14	31 128
Cultural services – total	89 954	19 693	22 190	24 729	11 297	987	11 612	204	180 666
Recreation	65 315	13 478	13 831	21 787	8 963	899	11 033	149	135 455
Recreational hunting	20 363	5 098	7 489	2 011		33		45	35 039
Nature education	4 277	1 116	869	931	2 334	55	580	10	10 172

Use table of ecosystem services – exchange values, thousand €

Ecosystem service/ Institutional sector, economic activity	A.01 Crop and animal production, hunting	A.02 Forestry and logging	B-E Industry	General government	Households	Intermediate services	Total use of 14 ES
Fodder	23 568						23 568
Agricultural production (crops)	32 272						32 272
Herbaceous biomass used for producing energy (bioenergy)			134				134
Wild berries, mushrooms					18 578		18 578
Wild game	8 712						8 712
Timber		338 602					338 602
Peat			34 863				34 863
Forest seed		116					116
Provisioning services - total	64 553	338 718	34 997		18 578		456 846
Global climate regulation: carbon sequestration				78 340			78 340
Air quality regulation					11 068		11 068
Pollination						31 128	31 128
Regulating services - total				78 340	11 068	31 128	120 536
Recreation					135 455		135 455
Recreational hunting					35 038		35 038
Nature education					10 171		10 171
Cultural services - total					180 666		180 666
Total	64 553	338 718	34 997	78 340	210 318	31 128	758 048

- has been considered important

- but the interpretation of the results is of question.

- analyses of the methods is underway both by stakeholders, universities * and in Statistics Estonia

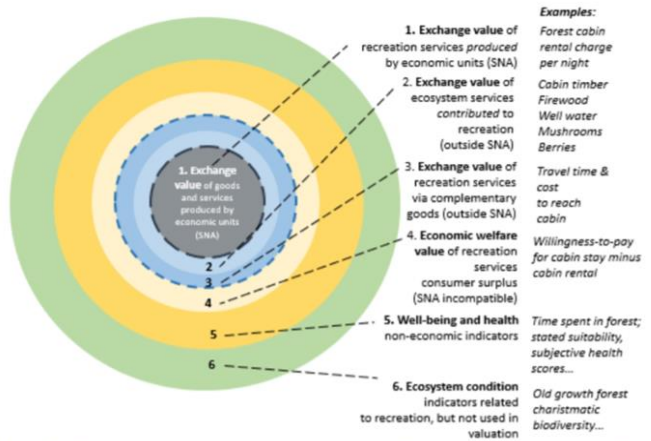
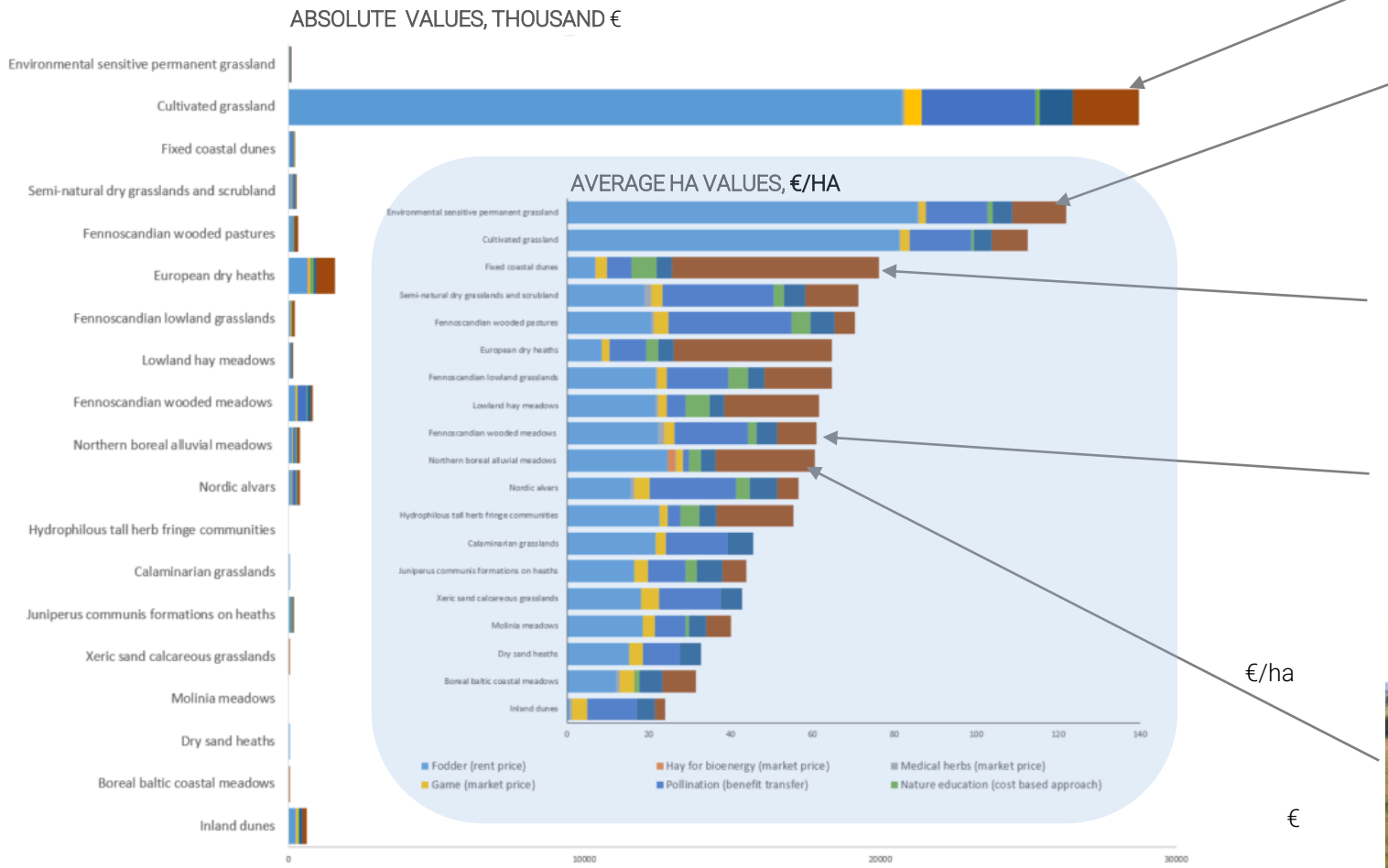


Figure 6.1 Plural values in the system of ecosystem accounts. Source: adapted from Barton et al., (2017).

(https://keskkonnaagentuur.ee/elme)

Experimental: Valuation of grassland ecosystem services

Provisioning services and cultivated grasslands values dominate



Cultivated grasslands

Fixed coastal dunes with herbaceous vegetation (“grey dunes”)

Fennoscandian wooded meadows

Northern boreal alluvial meadows

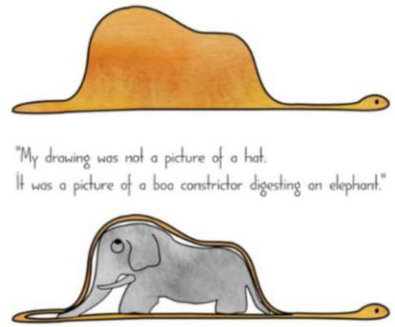
- - https://unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.33/2020/mtg1/S4_3_ESTONIA_KAIA_ORAS.pdf

What we do next:

2022 -2023

Compilation of the ecosystem accounts according to the needs of the upcoming ammendment of the regulation 691/2011 on ecosystem accounts:

- conversion to the EU typology (continuous still)
- emphases currently on physical flows, compilation/modelling of the of the services
- analysing and possibly developing ecosystem condition account
- analysis of the indicators/outputs of ecosystem accounting
- analyses of the ecosystem services valuation methods



Starting from 2023 :

- automatization of the compilation of extent account
- updating of the prototype for the map application of ecosystem accounts in ArcGIS Online

Final thoughts…

- Extent account together with an ownership dimension, useful ☺
- Ecosystem typology was needed it has to be created ☺
- Crosswalks have been tested for EUNIS, UNFCCC and IUCN classes. Now also for EU MAES based EU classification ☺
- Experimental ecosystem services accounts, ⇨ potential is recognized (links to national accounts) promising

Read more:

Recreation ecosystem service, calculation of the contributions from different ecosystems, UN London Group on Environmental Accounting, Sepember 2022

Aggregation of the ecosystem service values in urban ecosystem account, application of the principles of gross ecosystem product (GEP), UN London Group on Environmental Accounting, Sepember 2021;

Comparison of methods for the valuation of the nature education ecosystem service, UN London Group on Environmental Accounting, October 2021

Chance for Better Policy: Can Ecosystem Account Provide a Missing Link between the Services Provided by Ecosystems and the Land Owners; UN London Group on Environmental Accounting, 2020;

Two Languages or Two Narratives: Comparison of the Selected Market Price and Revealed Preferences Valuation Methods to the Stated Preferences Method; UN London Group on Environmental Accounting, 2020

Ecosystem Services partnership 3rd conference, T17From assessment to accounting: how countries experience the development of NCA. Insights from applications. Lessons learned on accounting for ecosystem services: bridging the values of services and measures taken. Juuni, 7-10, 2021

6thJoint OECD/UNECE Seminar on Implementation of SEEA. Session: SEEA ecosystem accounts and its relevance in policy and decision making March 9th 2021.

Dedicated website:
https://www.stat.ee/en/find-statistics/statistics-theme/environment/biodiversity-protection-and-land-use

Seminar „Development of ecosystem extent account and valuation of ecosystem services“
June 11, 2021, Zoom meeting, click here

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Thank you!

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