

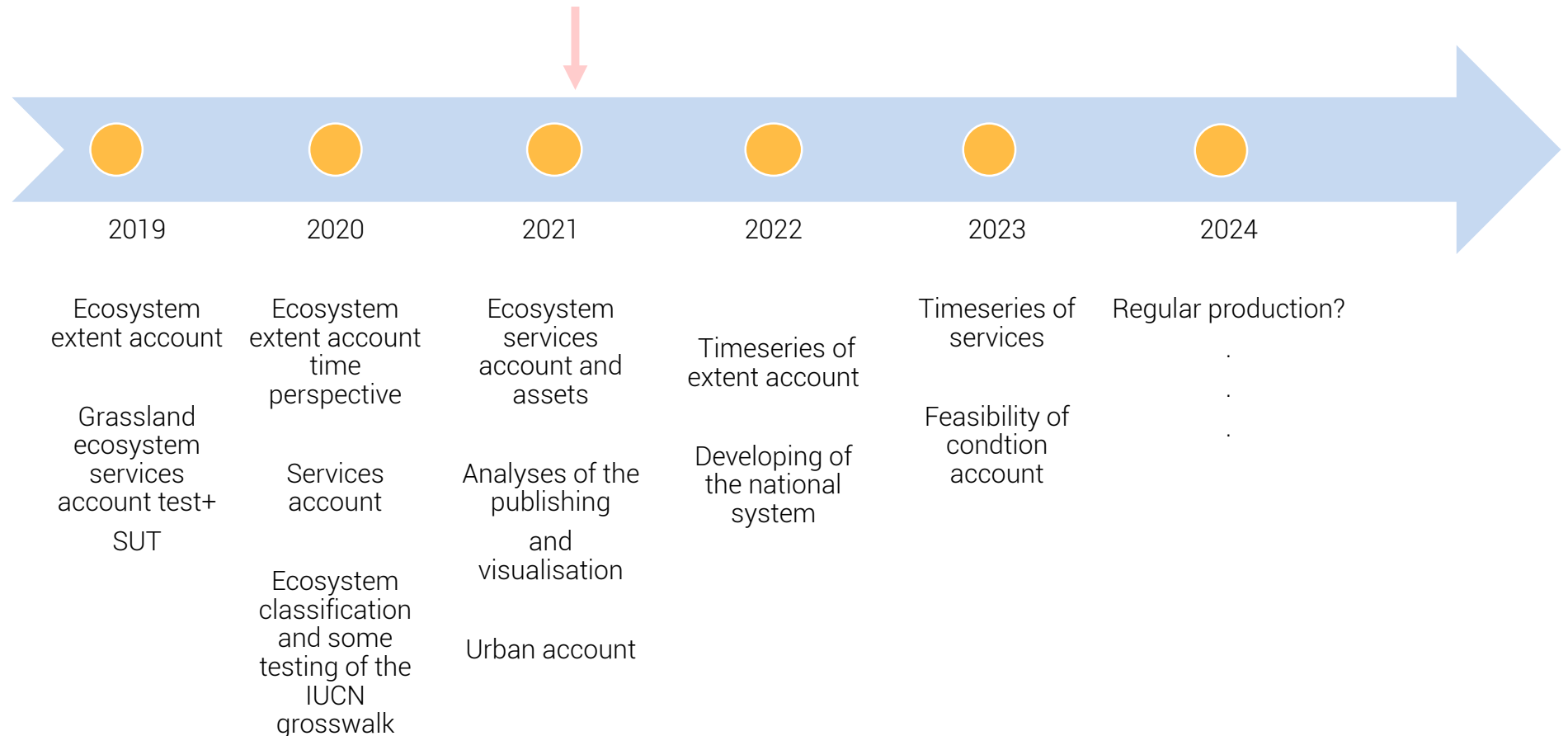
SEEA ECOSYSTEM ACCOUNTS (SEEA-EA) AND ITS RELEVANCE IN POLICY  
AND DECISION MAKING

Estonia

6<sup>th</sup> Joint OECD/UNECE Seminar on Implementation of SEEA  
Online meeting  
9-11 March 2021  
#SEEAseminar2021

DAY 1 – Tuesday 9<sup>th</sup> March

## Timeline of the development SEEA ecosystem accounts in Estonia



Main partners:

- Tallinn Technical University (who are in lead of environmental economics in Estonia)
- Environmental Ministry and Estonian Environmental Agency, MAES Implementation Team (Tartu University, Estonian University of life Sciences)
- Work is closely related and partly carried out under Eurostat grants 831254-2018-EE-ECOSYSTEMS and 881542 2019- EE- ENVECO on ecosystem accounts

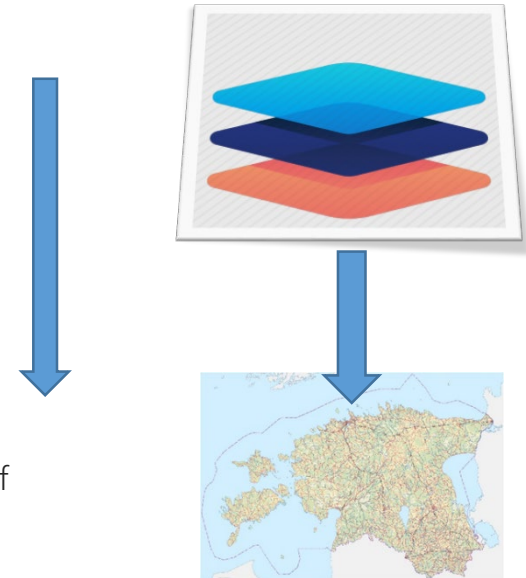
Results so far, some examples

# Ecosystem extent account, one deliverable: ecosystem map \*

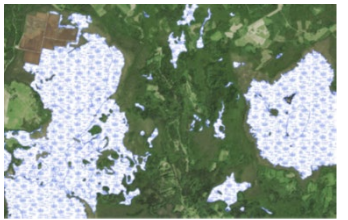
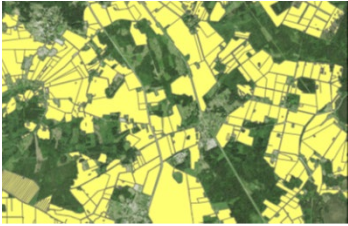
Merging different data layers into one layer  
Decision tree and priorities to overlay the map layers:

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.

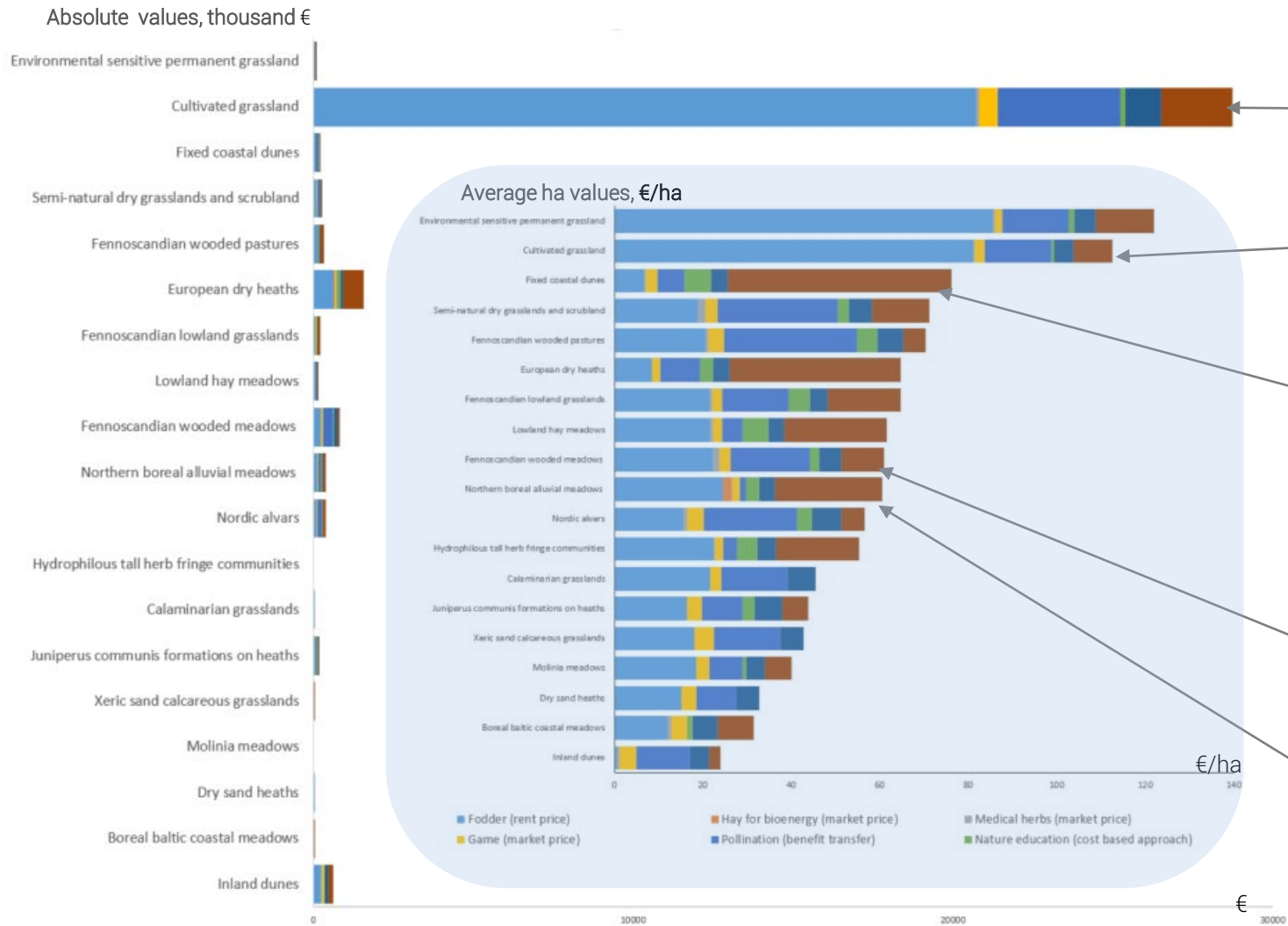


Ecosystem map:  
Altogether ~3.8 million polygons  
140 different mapping units  
Ecosystem typology: EUNIS,  
national (in progress),  
crosswalk to IUCN (in progress)



# Ecosystem services of grasslands \*

## 5 Examples of the deliverables: services profiles for grasslands ecosystems by types



Cultivated grasslands



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



Fennoscandian wooded meadows



Northern boreal alluvial meadows

Ecosystem accounts in policy and decision making  
Seminatural grasslands, some examples

## Seminatural grasslands: reaching of the targets



- Could the ecosystem extent account be of help for targeting of the measures for grassland management?
- Reaching of the goal set by Nature Conservation Development Plan (NCDP) needs targeted measures.
- Semi-natural grasslands exist if they are managed\*.
- Yes, ecosystem accounts could be of help: in order to design the measures, we need to know the owners of the land where valuable/managed ecosystem reside.
- Owners dimension was not readily available but could be and was created.

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



\*- Semi-natural grasslands are heterogeneous biodiversity 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.

# Establishing the ownership dimension of Estonian ecosystem extent account

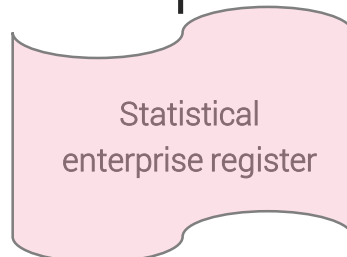
Ecosystem map



Land Cadastre



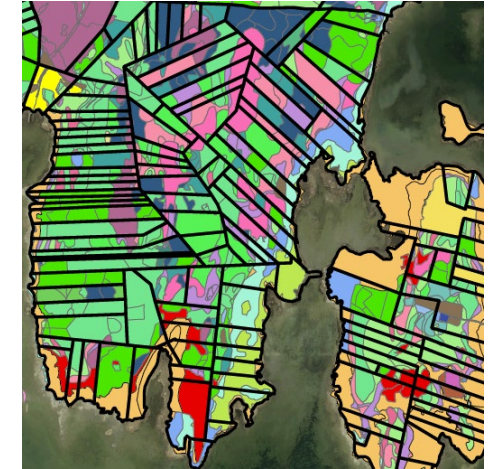
Statistical enterprise register



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	100	65	2 997
Constructed, industrial and other artificial habitats	55 190	25 558	8 794	80 072	2 498	3 259	176 577
Grasslands and lands dominated by forbs, mosses or lichens	29 224	67 413	29 091	110 059	3 805	2 058	212 556
Habitat complexes	5 739	4 900	1 926	9 343	457	178	20 618
Heathland, scrub and tundra	3 333	5 027	2 232	2 795	185	189	11 571
Inland surface waters	11 354	21 603	18 753	6 712	185	1 242	41 095
Inland vegetated or sparsely vegetated habitats	19 420	27 300	10 551	19 874	591	1 709	68 894
Marine	2 439	7 576	1 100	1 197	1 197	132	10 507
Mires, bogs and fens	17 413	208 592	201 043	15 606	536	19 281	261 428
Regularly or recently cultivated agricultural, horticultural habitats	103 232	323 761	6 393	661 207	8 377	5 706	1 102 284
Woodland, forest and other wooded land	113 178	152 812	1 049 105	680 055	15 654	81 392	2 419 091
NA	202	464	303	357	15	23	1 062
<b>TOTAL</b>	<b>361 356</b>	<b>223 252</b>	<b>1 334 720</b>	<b>1 603 376</b>	<b>33 954</b>	<b>115 232</b>	<b>4 346 480</b>

More detailed levels  
are available in both  
dimensions



# Seminatural grasslands management: example of the analyses table, 2019\*

Ecosystem type	Code	AREA, ha	Management status, ha			Ownership, ha								
			To be managed according to the target	Managed	Additional need	Financial corporations	General government	Households	Households as physical persons	Non financial corporations	NPI&H	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		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 ecosystem 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

## Semi-natural grasslands, lessons learned: ownership statistics on ecosystem type level

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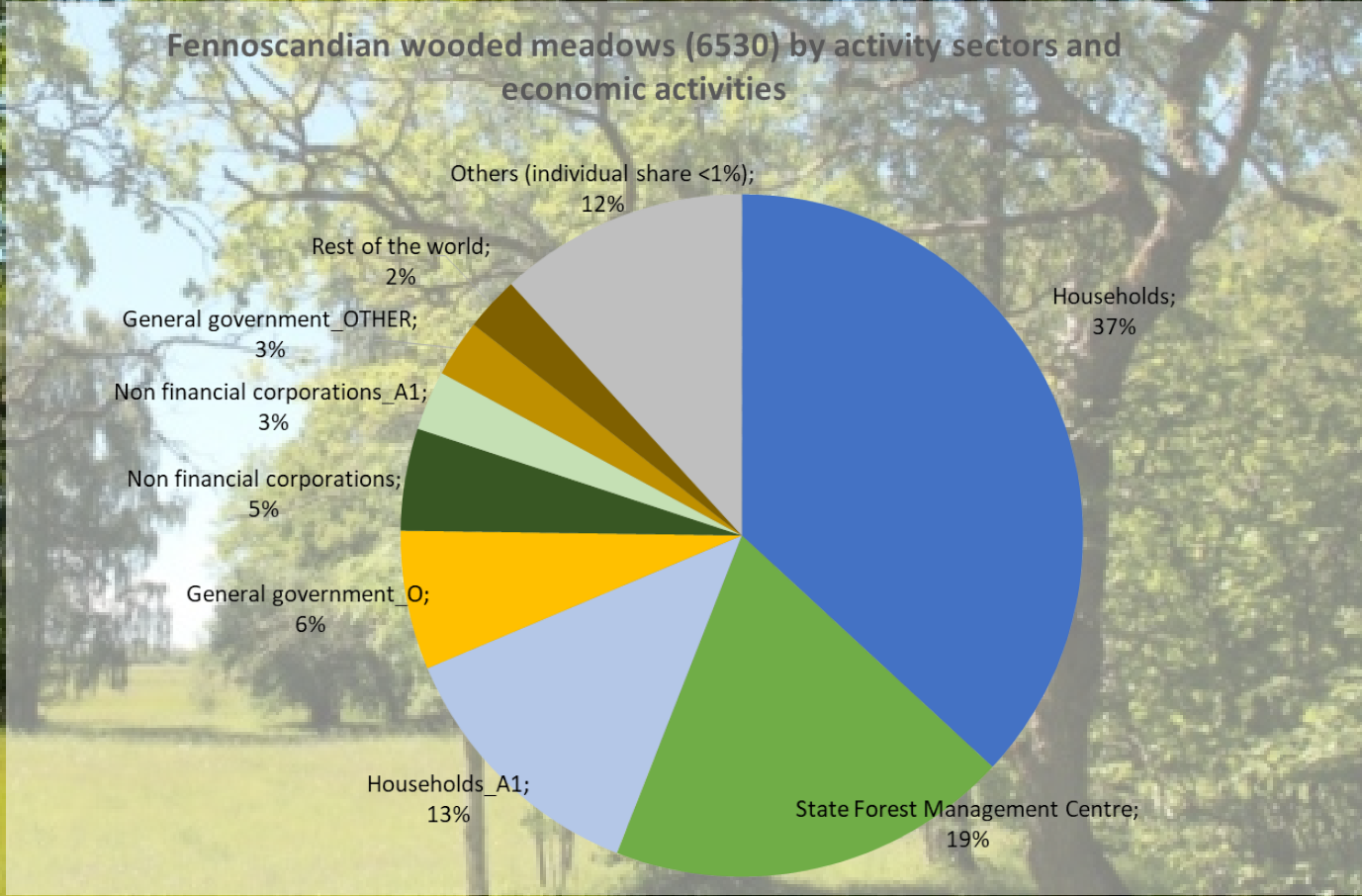
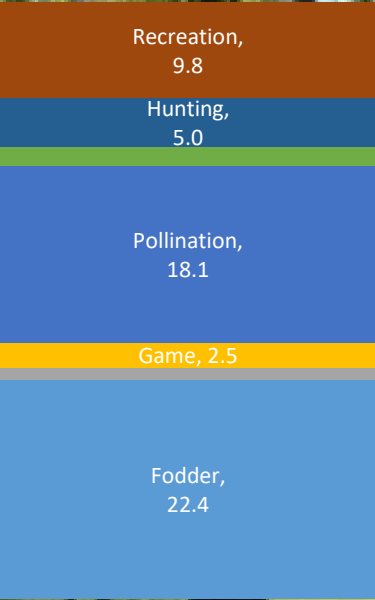
- Ecosystem extent account by ownership types is a new achievement
- Our suggestions on most relevant and feasible aggregation levels for ecosystems and economy (ownership) from the viewpoint of targeting the measures:
  - Ecosystem detailed type is important as grasslands are heterogeneous and are featuring distinctive services
  - Private / public ownership + the rest of the world
  - Split between households and enterprise sector would be desirable
  - Specific status enterprises like State Forest Management Centre in Estonia needs to be singled out
  - It seems that other corporations sector does not need a detailed breakdown as they possess just a small share of land where ecosystems of interest are situated on.
- Distinction between the owner and the economic actor would be important in future
- We compile a second year in order to provide more functionality and record the changes as well

# Linking the information on services values, ecosystem types and ownership (wooded meadows)

Estonian grassland ecosystem types by activity sectors and economic activities, ha

Experimental average hectare values of the ecosystem services (preferred method) and the sum of services, €/ha, 2018

Ecosystem Type	Area (ha)	Sum of Services (€/ha)	Activity Sector	Economic Activity
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...



# Linking the information on services values, ecosystem types and ownership (cultivated grasslands)

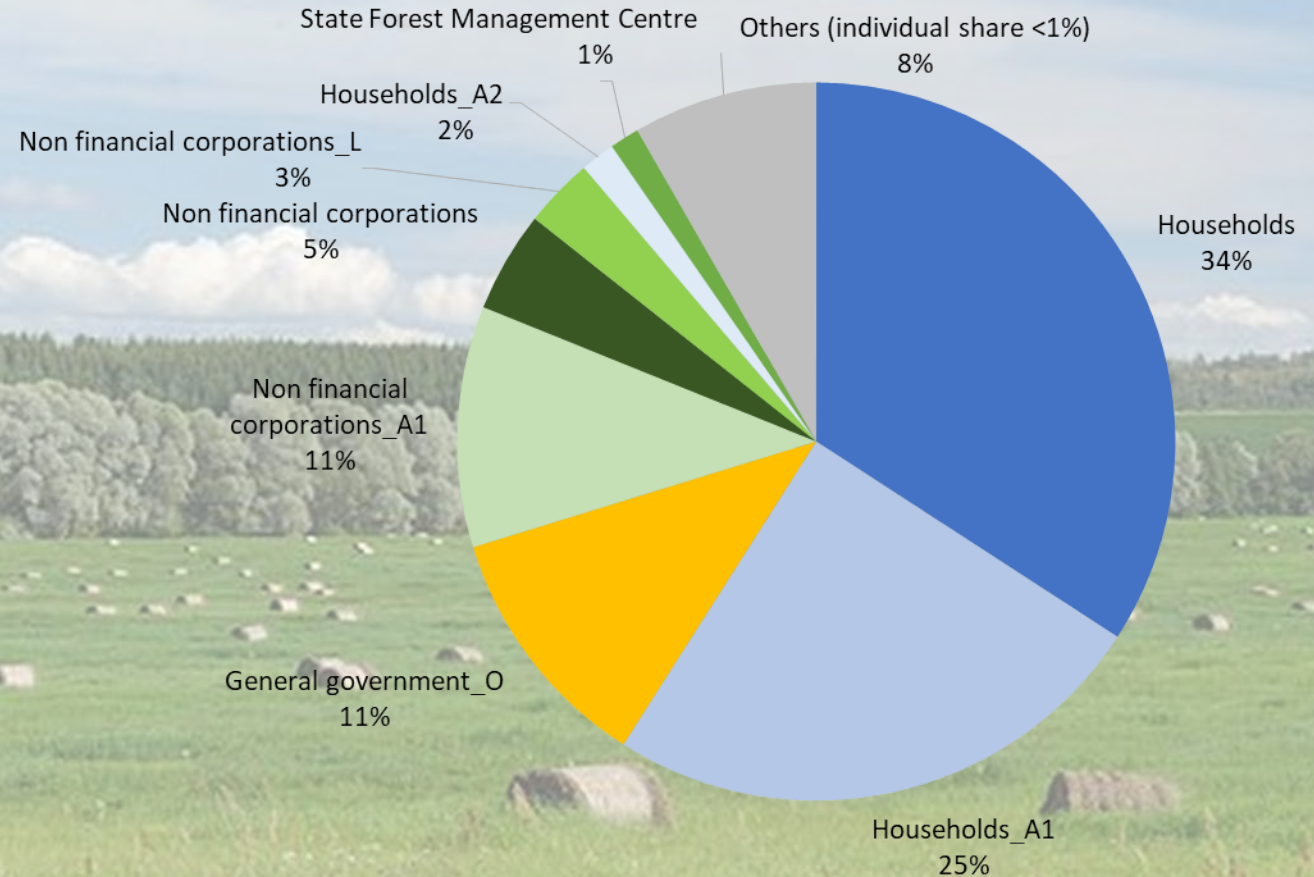
Estonian grassland ecosystem types by activity sectors and economic activities, ha

Supply of ecosystem services for grasslands, selected methods and total value of eight selected services, thousand €, 2018

Activity Sector	Household	Non-financial corporations	General government	State Forest Management Centre	Others
Household	81.2	15.1	8.7	4.5	0.5
Non-financial corporations	15.1	81.2	8.7	4.5	0.5
General government	8.7	15.1	81.2	4.5	0.5
State Forest Management Centre	4.5	4.5	4.5	81.2	15.1
Others	0.5	0.5	0.5	0.5	81.2



## Cultivated grasslands (environmental sensitive and environmental non-sensitive permanent grasslands) by activity sectors and economic activities



## Lessons learned: linking the information on services values, ecosystem types and ownership

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- Ecosystem services profiles can complement the extent account and increase the potential to provide a bases for planning and monitoring.
- Ecosystem services profiles could be important for landowners and everyone who decides on the purpose of the cadastral unit.
- We hope that with more services mapped and valued the ecosystem services profiles could be used to analyse alternative uses of different types of land (ecosystems).



WORK IN PROGRESS

## Further use of the results of derived statistics: linking of the subsidies data

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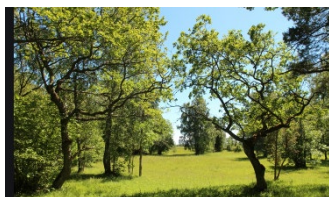
- We made an attempt to link the figures on financial support to the grassland ecosystem types
- We compared the estimated value of services provided, expenditures made and subsidies received.
- We questioned if the financial support for the management, restoration and conservation of semi-natural grasslands is adequate considering the scope and magnitude of the services provided by these ecosystems.



WORK IN PROGRESS



# Illustrative analyses table: per ha values of eight estimated ecosystem services and the rates of the subsidies to improve the status of semi-natural grasslands\*



Ecosystem type	Area (ha)
Grassland	498 505
Semi-natural grassland	241 953
Semi-natural grassland according to the NATURA classification	97 044
Boreal baltic coastal meadows	19 946
Fixed coastal dunes	397
Dry sand heaths	43
Inland dunes	27
European dry heaths	561
Juniperus communis formations on heaths	3 837
Xeric sand calcareous grasslands	32
Calaminarian grasslands	0
Semi-natural dry grasslands and scrubland	5 381
Fennoscandian lowland grasslands	6 175
Nordic alvars	14 616
Molinia meadows	3 693
Hydrophilous tall herb fringe communities	3 641
Northern boreal alluvial meadows	25 811
Lowland hay meadows	5 348
Fennoscandian wooded meadows	4 569
Fennoscandian wooded pastures	2 965
Other semi-natural grassland	144 908
Cultivated grassland	256 552
Permanent grassland	256 552
Environmental non-sensitive permanent grassland	255 998
Environmental sensitive permanent grassland	554

Value of the services, REVEALED PREFERENCES METHODS, €/ha									Value of the services, CVM, €/ha												Total	
Fodder (rent price)	Hay for bioenergy (market price)	Medical herbs (market price)	Game (market price)	Pollination (benefit transfer)	Nature education (cost based approach)	Hunting (cost based approach)	Recreation (time use)	Total value exchange based	Supply of agricultural production	Provision of genetic and medical resources	Enabling pollination and honey harvesting	Flood protection	Climate control	Photosynthesis (production of oxygen)	Ensuring landscape diversity	Maintaining soil fertility	Habitat conservation for biological species	Enabling environmental education	Provision of tourism and leisure services	Provision of tourism and leisure services	Total value of the services (€/ha)	
52	0	0	2	14	2	4	11	85	2,9	3,1	3,1	2,8	4,1	4,0	3,8	3,8	5,2	2,6	2,4	37,6	161	
21	0	1	2	13	3	4	13	57	2,2	2,4	2,4	2,2	3,2	3,1	3,0	2,9	4,1	2,0	1,9	29,4	86	
21	1	1	3	9	3	5	14	56														
12	0	1	3	0	1	6	8	31														
7	0	0	3	6	6	4	51	76														
15	0	0	3	9	0	5	0	33														
1	0	1	4	12	0	4	2	24														
9	0	0	2	9	3	4	39	65														
16	0	0	4	9	3	6	6	44														
18	0	0	4	15	0	5	0	43														
22	0	0	2	15	0	6	0	46														
19	0	2	3	27	3	5	13	71														
22	0	0	2	15	5	4	16	65														
16	0	1	4	21	3	7	5	57														
19	0	0	3	8	1	4	6	40														
23	0	0	2	3	5	4	19	55														
25	2	0	2	2	3	3	24	60														
22	0	1	2	5	6	4	23	62														
22	0	1	2	18	2	5	10	61														
21	0	1	3	30	5	6	5	70														
23	0	0	2	15	2	4	12	59														
81	0	0	2	15	0	5	9	113	0,6	0,7	0,7	0,6	0,9	0,9	0,8	0,8	1,1	0,6	0,5	8,2	121	
81	0	0	2	15	0	5	9	113														
81	0	0	2	15	0	5	9	113														
86	0	0	2	15	1	5	13	122														

FIN. INSTRUMENTS, €/ha		
Agricultural subsidies, mowing	Agricultural subsidies, grazing	Other
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
>85	>150	
<=450	<=250	
<=450	<=250	
>85	>150	

Problems regarding services ha values: provisioning services dominate selection of the services is limited, conceptual issues

Data on subsidies rates and service ha values for detailed ecosystem types in comparison



## Lessons learned: linking of the ecosystem services and subsidies

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It cannot be said yet if the financial support for the management, restoration and conservation of semi-natural grasslands is adequate considering the scope and magnitude of the services provided by these ecosystems.

Bottlenecks currently:

- figures on financial support for grassland ecosystem management could not be directly linked to the ecosystems types
- provisioning services dominate and the selection of the services is narrow
- The non-inclusion of non-market services (services which do not have a monetary equivalent directly or indirectly in the market) in the accounts threatens with the underestimation of the value of ecosystem services



Ecosystem accounts in policy and decision making...further thoughts

## Under discussion currently: accounting for market and non-market ecosystem services

Example of three ecosystem services benefits: good dinner, walk in a forest and existence of biological species.



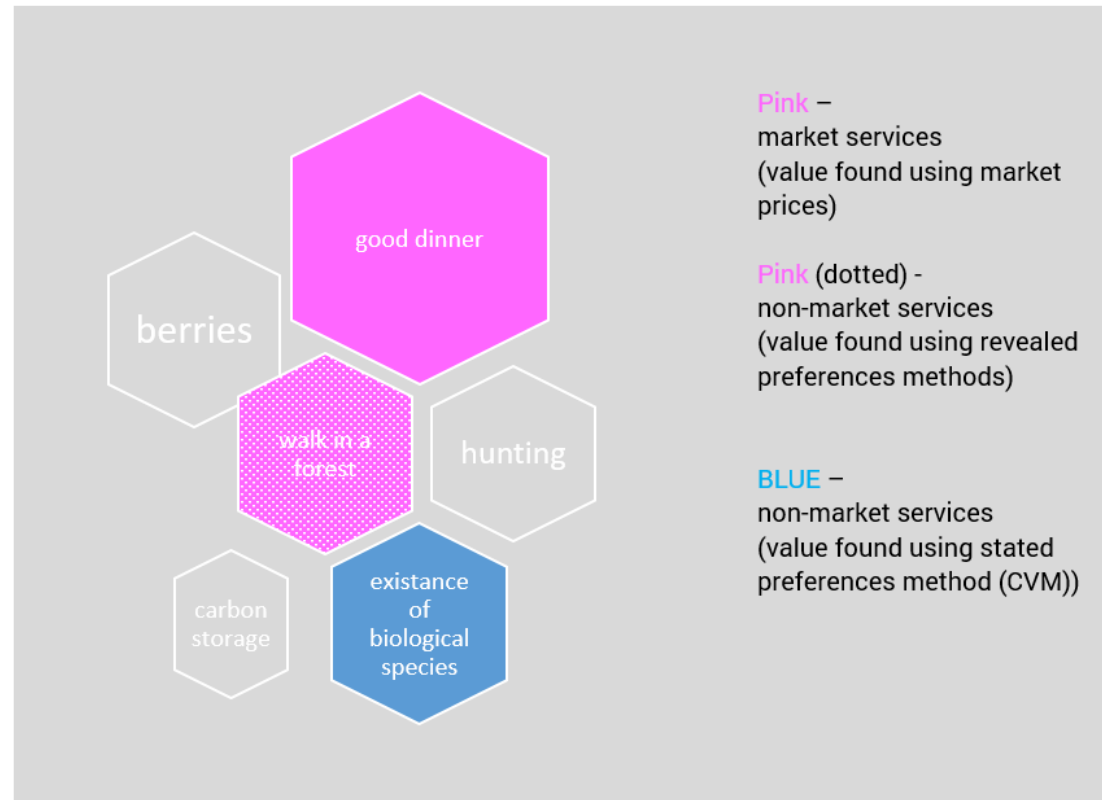
We question:

Are market and non-market values (without direct output having market price) comparable and what unites them?

Answer:

Yes, comparable.  
All ecosystem services increase individual's welfare regardless of their participation in the market.

No, distinctive, valuation methods differ



## Final thoughts...

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### Ecosystem accounts in policy and decisionmaking in Estonia

- Extent account together with an ownership dimension, ➡ useful
- Ecosystem services accounts, ➡ potential (links to national accounts) is recognized
  - ➡ promising as ideally the value of land should reflect the value of services
  - ➡ we widen the scope of the services accounts to all ecosystems and to wide range of services (stakeholders view).
- Evaluation of potential linkages between subsidies paid and services provided by ecosystems, ➡ needs further efforts



Thank you!

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