

VALUATION OF PUBLIC GOODS AND ECOSYSTEM SERVICES PROVIDED BY AGRICULTURE

Ligita Melece

Ligita.melece@arei.lv

Ilze Šēna

Institute of Agricultural Resources and Economics

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Aim of study

The aim of the study is twofold:

- 1) to ascertain the concepts and options for ecosystem services, particularly, agro-ecosystem services, valuation; and
- 2) to assess the supporting activities, based on implementation effectiveness analysis of RDP 2007-2013 agri-environmental measures in Latvia.



Materials and methods

The principal materials used for the studies are as follows: different sources of literature, e.g. scholars' articles, research papers and the reports of institutions.

The data were obtained from:

- Eurostat online database;
- online database of Central Statistical Bureau (CSB) Latvia; and
- unpublished data from database of Latvian Rural Support Service.

For investigation of agricultural landscape sustainability aspects the following data were used:

- payment area under agri-environmental measures;
- amount of support paid for agricultural land or utilized agricultural area (UAA);
- structure of crop areas and the farming type.

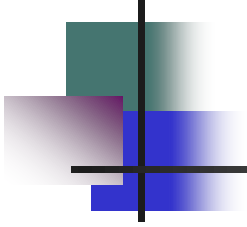


Materials and methods (cont.)

For evaluation and comparison the state and trends of agro-ecosystem management among EU countries, the data of the EU Member States and eight EU countries of Baltic Sea Region: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden, as well as the Baltic States were evaluated.

The suitable qualitative and quantitative research methods for certain tasks have been used in the process of study: monographic; analysis and synthesis; logical and abstractive constructional; spatial analysis of field blocks, using GIS*.

*GIS - Geographic information system



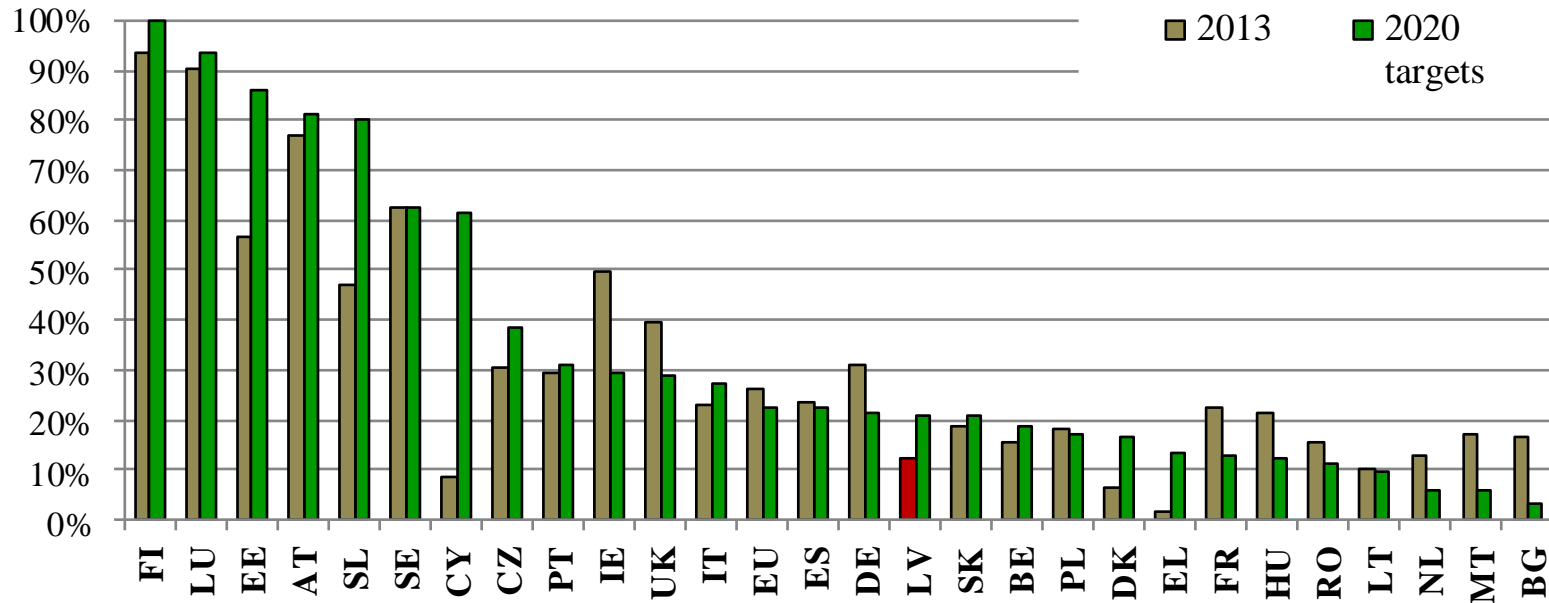
Results

The indicators, its groups and characteristics for agricultural landscapes' valuation

Group	Indicator	Characteristics	Data
Management intensity	Economic farm size	Distinguish between capital-intensive, large-scale farms and small-scale farms	ESU*
	Nitrogen (N) input	0–50; 50–150; and >150 N kg/ha	N kg/ha/year
Landscape structure	Energy Content Output (ECO)	ECO as a score between 0 and 1	MJ/ha/year
	Field Size	<0.5 ha, 0.5–1 ha, 1–10 ha and >10 ha	ha
	Green linear elements (GLE)	High values landscapes with small fields and/or GLE (e.g., tree lines, hedges)	No of GLE/ 250 m transect
Value and meaning	Product Designated Origin (PDO)	5 km buffer around defined PDO production area	No of PDOs
	Google Earth/Google Maps photo	Users added geotagged landscape photos to Google Earth/Google Maps	No of photos/km ²

*ESU - European size unit - standard gross margin EUR 1200

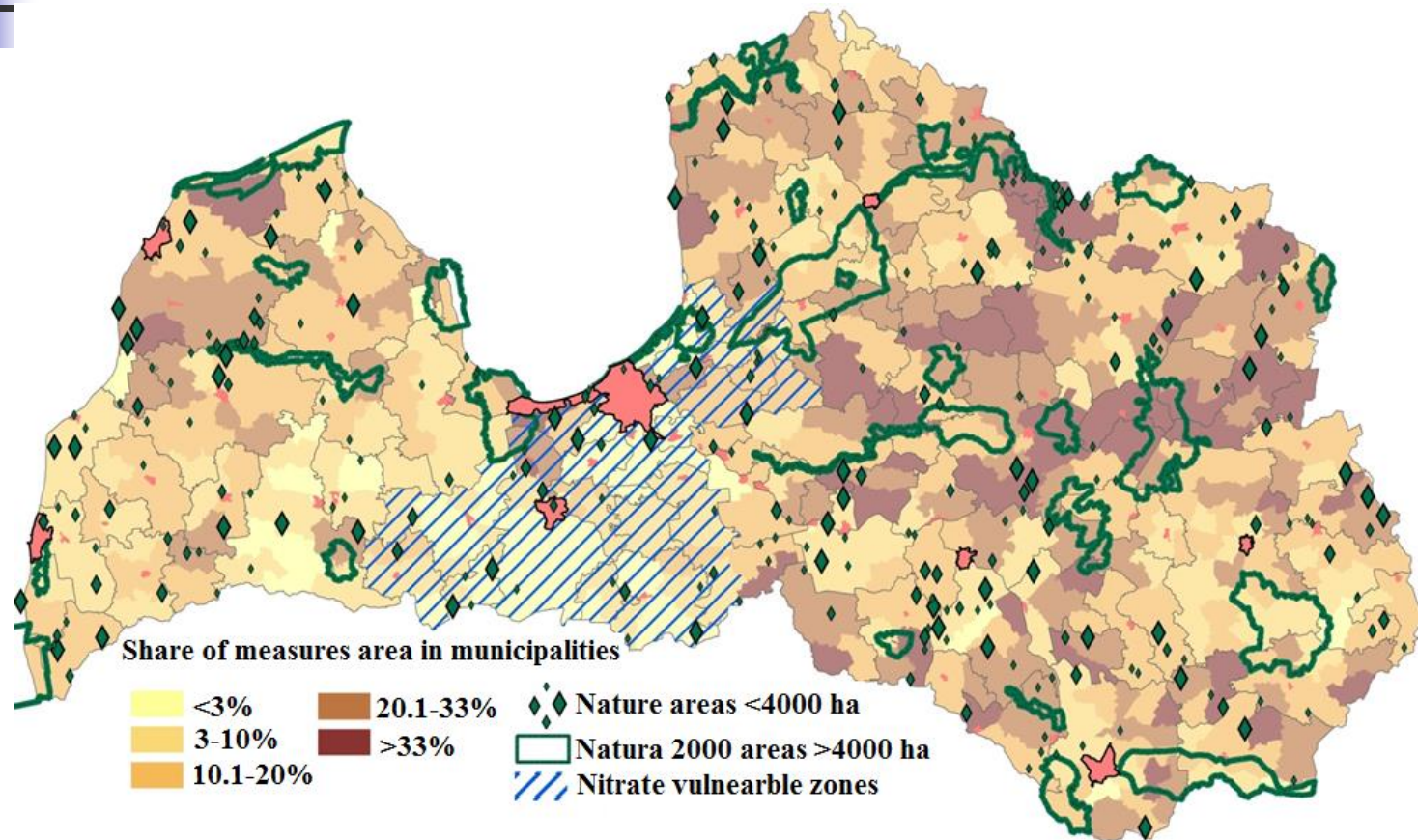
Share of area under agri-environmental commitments in total UAA of EU countries in 2013 and target in 2020



In 2013 Latvia was in the fifth latest place among the EU countries with the share 12.5% of UAA under agri-environmental payments.

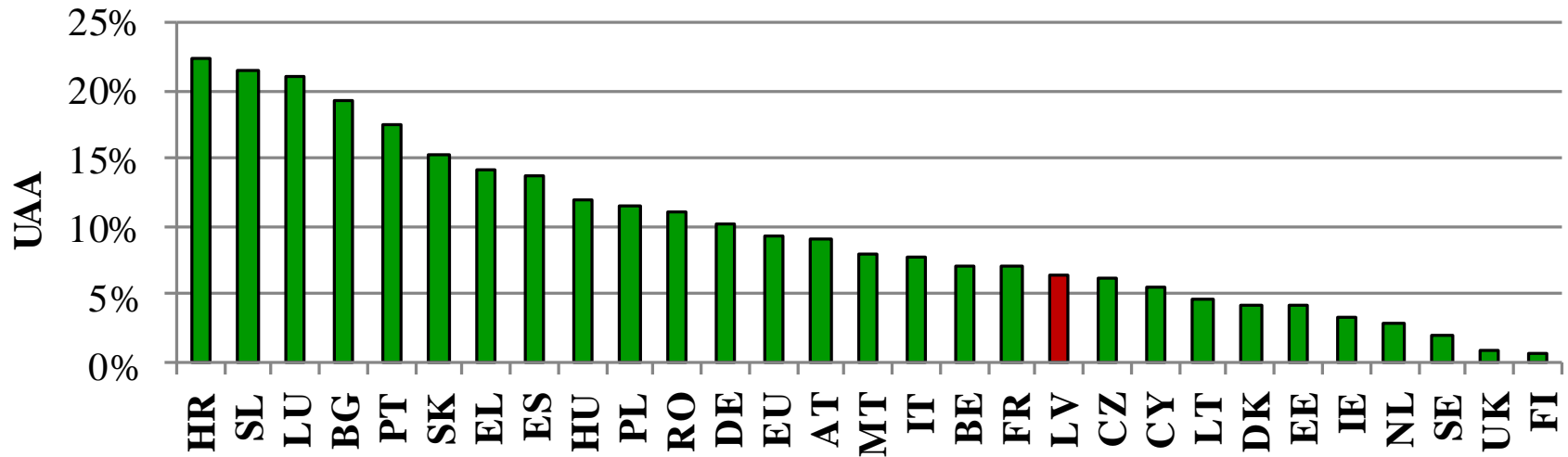
Latvia is among other countries with the lowest target, but shows the worst results.

Share of area under implemented agri-environmental measures in Latvia's municipalities, and most important environmental target territories, 2013



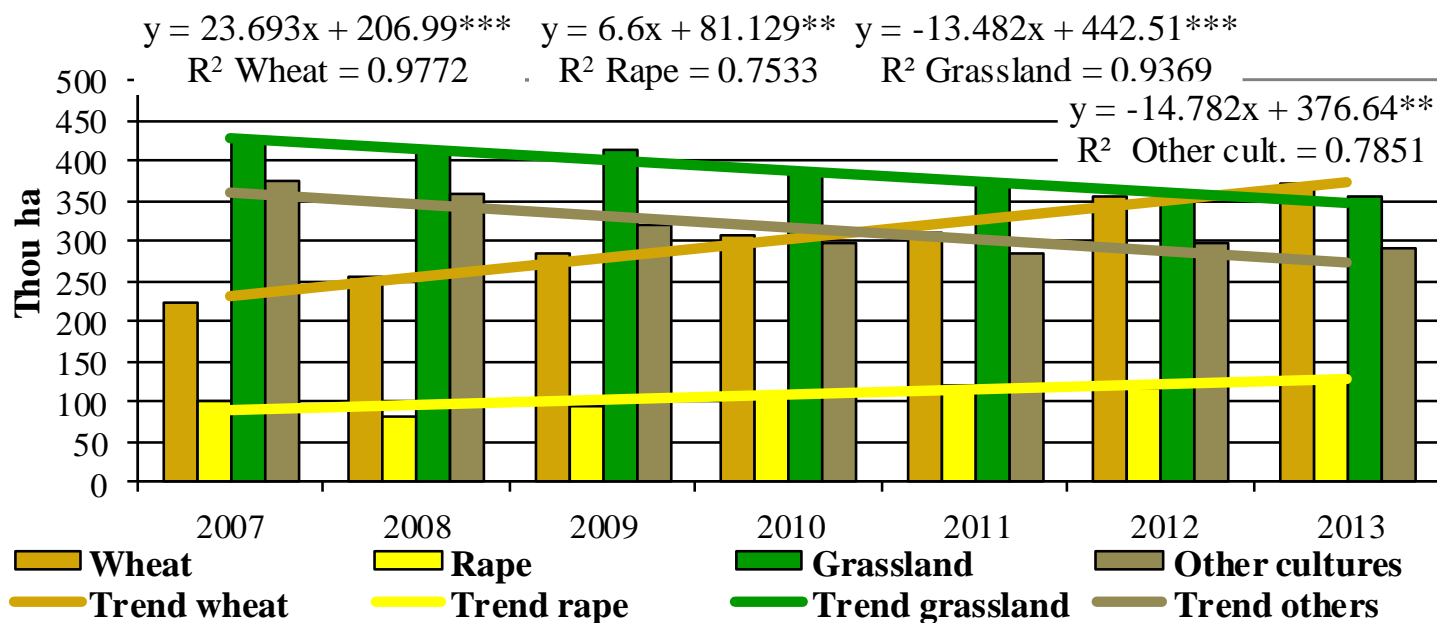
Share of agri-environment measures' areas are not implemented in the areas with higher importance of landscape resilience - the Natura 2000 areas; as well as nitrate vulnerable zones.

Share of UAA under Natura 2000 in EU countries and EU average, 2016



The share of UAA under Natura 2000 is not a highest among EU countries.

The area trend of wheat, rape, permanent grassland and other cultures, 2007-2013



** - $\alpha < 0.05$; *** - $\alpha < 0.01$

In Latvia 40–80% of the EU important grassland habitats in Natura 2000 areas were not managed properly.

Estimated cost to maintain permanent grassland by Baltic Sea countries and EU average

Country	PEA* average, ha	PG** in PEA, %	Costs	
			EUR/ha PG	EUR/ha PEA
Denmark	80.7	5%	124	3
Germany	84.3	24%	251	37
Estonia	123.5	20%	56	3
Latvia	61.3	27%	4	0
Lithuania	51.4	12%	15	1
Poland	17.3	17%	176	20
Finland	51.6	2%	173	1
Sweden	96.6	15%	274	17
EU-27	31.2	25%	216	17

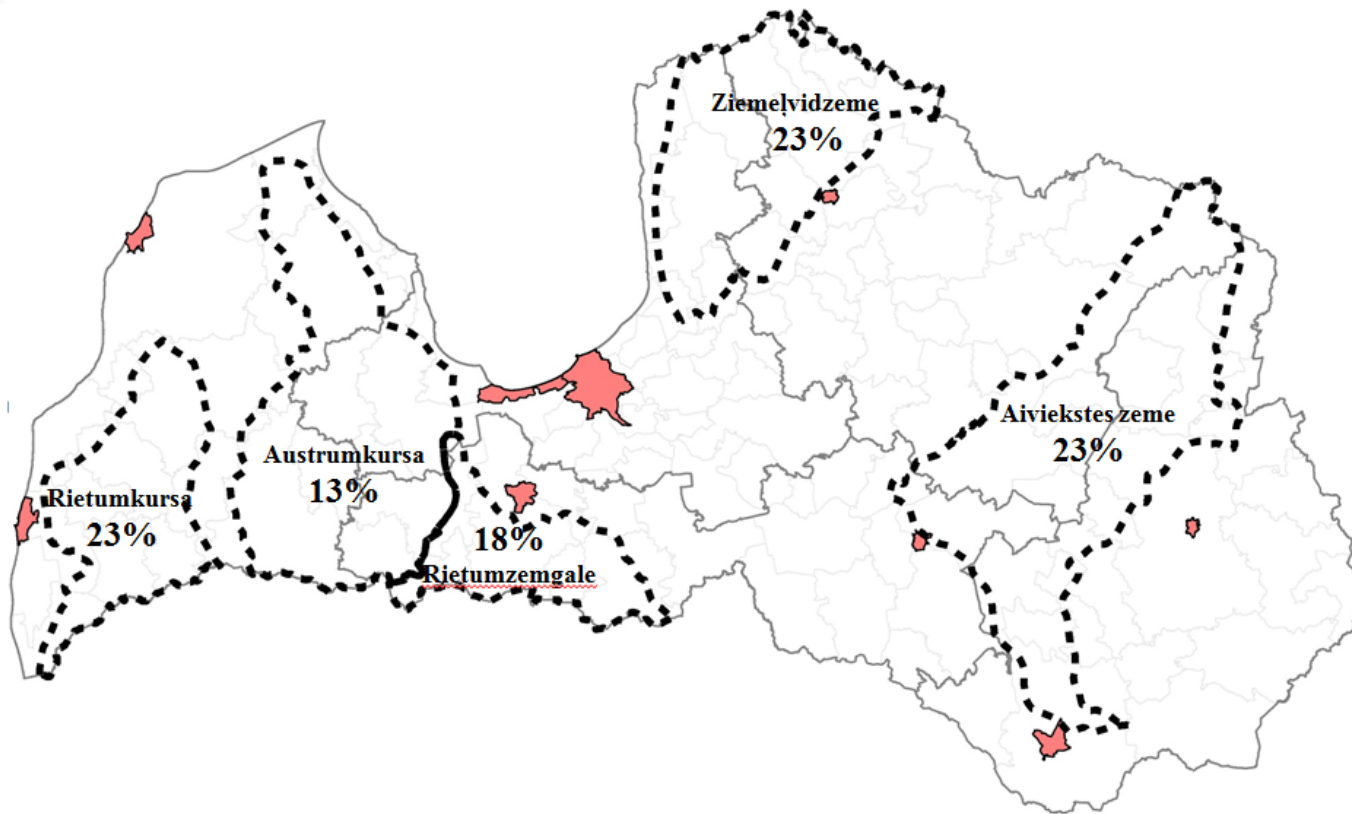
* PEA - potential eligible area; ** PG - permanent grassland (pasture)

The changes of various crops area (thou ha) from 2005 to 2016

Crop type	2005	2016	2016/2005, %	
Winter wheat	132.0	329.9	149.9%	↑
Rye	39.3	36.3	-7.6%	↓
Winter barley	2.8	2.0	-28.6%	↓
Winter triticale	13.3	9.3	-30.1%	↓
Wheat	55.4	153.0	176.2%	↑
Barley	145.9	94.1	-35.5%	↓
Oat	58.0	64.6	11.4%	↑
Buckwheat	10.4	17.9	72.1%	↑

The proportion of cereals in some protected landscapes is higher (23%) than in all territory of Latvia (19%)

Proportion of cereals' area in Latvia's protected landscape areas, average of 2013-2016



Proportion of cereals in some protected landscapes is higher (23%) than in all territory of Latvia (19%)



Main conclusions

Ecosystem services, particularly agricultural ecosystem services, including cultural (agricultural) landscapes, have the direct and indirect contributions to human well-being, including survival and quality of life, and accordingly constitute the bases for sustainable rural development.

The spatial analysis of implemented agri-environmental measures of Rural Development Program 2007-2013 in Latvia shows that the expected positive effect on the sustainability and resilience of agricultural landscape as a provider of ecosystem services, as well as conservation of both agricultural biodiversity and nature biodiversity have not been received.



Main conclusions

There are two contradictory groups of requirements that could be fulfilled by agriculture and farming to provide a number of ecosystem services:

- First group contains so called provisioning ecosystem services and requires intensifying and raising the food and biomass production.
- Second group contains new services of ecosystem services so called regulating services and various activities to preserve nature and ecosystems' functional capacities, especially biodiversity.



Acknowledgments

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Thank you for attention!

Table 1. Number of farms by and use group and its change (%) in Latvia, 2003-2016

Farm, ha	2003	2005	2007	2010	2013	2016	2016/2003	
≤0.9	1991 9	1764 0	1060 7	4216 1	1030 1	5865	-70.6%	
1.0-9.9	7780 4	7708 5	6445 9	4642 4	3957 5	34316	-55.9%	
10.0-19.9	2007 0	2222 6	2063 3	1749 6	1579 1	14570	-27.4%	↓ ↓
20.0-49.9	9294	1074 9	1075 3	9625	9461	8750	-5.9%	
50.0-99.9	2246	2515	2870	2739	2695	2887	28.5%	↓
100.0-199.9	890	1128	1260	1387	1454	1623	82.4%	
200.0-499.9	446	541	662	781	961	1100	146.6%	
≥500	179	230	288	402	480	524	192.7%	↓

Table 1. Number of farms by land use group and its change (%) in Latvia, 2003-2016

Farm size, ha	Number of farms						Changes, 2016/2003
	2003	2005	2007	2010	2013	2016	
≤0.9	19919	17640	10607	4216	10301	5865	-70.6%
1.0-9.9	77804	77085	64459	46424	39575	34316	-55.9%
10.0-19.9	20070	22226	20633	17496	15791	14570	-27.4%
20.0-49.9	9294	10749	10753	9625	9461	8750	-5.9%
50.0-99.9	2246	2515	2870	2739	2695	2887	28.5%
100.0-199.9	890	1128	1260	1387	1454	1623	82.4%
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