

Socio-economic evaluation of lamprey stock importance to the region

Part I

Cultural and economic importance of lamprey stocks and fishery to the region

Project: Cross-boundary evaluation and management of lamprey stocks in
Lithuania and Latvia, LAMPREY LLI-310

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Abbreviations

BIOR	Institute of Food Safety, Animal Health and Environment “BIOR”
CSB Latvia	Central Statistical Bureau of Latvia Republic
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FVS	The Food and Veterinary Service
IUU	Illegal, unregulated and unreported lamprey fishing
MoA	Ministry of Agriculture of Latvia Republic
OSP	Official Statistics Portal of Lithuania
SES	The State Environmental Service of the Republic of Latvia

Introduction

The socio-economic evaluation of the importance of river lamprey stock to the lamprey fishing areas in Kurzeme region (Latvia) and Klaipeda county and Telsiai county (Lithuania) is carried out under the Interreg V-A Latvia – Lithuania Cross-border Cooperation Programme 2014-2020, project “Cross-boundary evaluation and management of lamprey stocks in Lithuania and Latvia (LLI-310 LAMPREY). The project aims to reinforce sustainable, scientific data-based management of lamprey stock by proposing common Strategy for lamprey stock management in Latvia and Lithuania, and to increase integration between national bodies responsible for fisheries management. This report is Stage 1 of the total evaluation, and it includes assessment of the cultural and economic importance of lamprey stocks and fishery to the region.

The study territory covers all river lamprey fishing area in Lithuania (Sventoji settlement, Nemunas downstream and Curonian lagoon), while Kurzeme region holds approximately 1/3 of the total lamprey catches in Latvia.

The purpose of the study is to assess the societal and economic benefits that are generated from the river lamprey stock; to analyse the value-added chain in lamprey-related activities, and the role in maintenance of the traditional identity of the region. The relevant findings of this study will be incorporated by LAMPREY project partners into lamprey stock management Strategy, common for both Latvia and Lithuania.

The river lamprey is the only exploited lamprey species in Latvia and Lithuania with local role in commercial fishery and conservation concern in Europe. The lamprey-related pattern includes the community that harvest lamprey from the biological stocks in order to provide products for the market and revenues to the fishers. It also forms a part of cultural identity and traditions of the fishing areas and total region. To cover all these relationships and to evaluate the social and economic importance of the river lamprey stock to the region, the set of indicators is created by observing economic, social and environmental aspects. The following tasks were set for the study:

- 1) to characterise the socio-economic situation in Klaipėda county, Telsiai county and Kurzeme region by determining the factors of the quality of life, the population structure and dynamics since 2015, economic activity in the territory and the role of fishing in it;
- 2) to analyse market related, cultural and environmental aspects of lamprey fishing, processing and consumption of the lamprey products in the region in accordance with the approach of value chain;
- 3) to analyse the fishers' and other stakeholders' perception of fishery and lamprey stocks as part of the local ecosystem services.

The study includes official statistics and available results of the previously done research. Considering limited access to the social and economic data due to the local character and comparably small scale of the lamprey-related activities, the results of the semi-structured interviews with stakeholders and local residents' survey have been used widely in the study.

The study has been carried out in accordance with the Agreements No LK-2019-16 and sub-agreements No LK-2019-17 and No LK-2019-18. The authors for the evaluation of cultural and economic importance of lamprey stocks and fishery to the region of Latvia are Ieva Leimane and Viktorija Lismane. The authors for the evaluation of cultural and economic importance of lamprey stocks and fishery to the region of Lithuania are Dr. Donalda Karnauskaitė and Eglė Baltranaitė.

The report is prepared in cooperation with the Project partners: Lithuanian Fund of Nature, Klaipeda University and BIOR.

1. Materials and methods

1.1. Information sources

The study deploys various sources of information, the most important of which are the results of semi-structured interviews with the lamprey industry stakeholders, the results of the local residents' survey, published statistical data and results of the previous research and publications.

Interviews

Considering the limited access to the data related to lamprey industry due to its comparably small scale and local character, the stakeholders in Kurzeme region (Latvia) and Klaipeda and Telsiai counties (Lithuania) have been contacted to obtain their experiences on specific requirements of this study through semi-structured interviews. In case of Latvia, the individual direct interviews were held, in case of Lithuania, the interviews were carried out during the stakeholders' meetings in Šventoji and Rusne. The representatives for the interviews have been approached both aiming for a good region coverage and different perspectives regarding the study (see table 1.1).

Table 1.1 Summary of hold semi-structured interviews during the study in LV and LT

Respondents	Number of interviews (Lithuania)	Number of interviews (Latvia)
Local fishers or fishing companies	9	15
Fish smokehouses	4	4
Fish traders	6	3
Restaurants	6	3
Tourism organisations	5	3
Representatives from the local municipalities' in project area	9	3
Representatives from the institutions responsible for fisheries management	3	7

The detailed list of contacts as well as the questionnaire of the interviews can be found in Annex 4.

Local residents' survey

During the study, in October - November 2019, the local residents' survey (hereinafter - Survey) has been carried out, covering project area in Latvia and Lithuania. The results of this survey are unique source of information for this study. The survey includes the questions concerning lamprey consumption habits, traditions and other societal values that may be generated from the river lamprey stock. The survey questionnaire is attached as Annex 1 to this study report.

In case of Latvia the survey was held electronically, by a data collection professional specializing in online quantitative research. In total 511 respondents participated in the survey, including 254 from Kurzeme region and 257 from Riga and Pieriga region (see table 1.2). It was found during the desk research that the consumption of lamprey products in Latvia is largely related to the population living in Riga and Pieriga region. For the purpose of the study, in order to get a better understanding of the lamprey consumption habits, the pool of survey respondents was expanded outside the Kurzeme region including local residents of Riga and Pieriga region.

Table 1.2. General characteristics of the survey respondents in Latvia

Characteristics		Respondents	
		persons	% of total
Region	Kurzeme region	254	50
	including, coastal municipalities	176	69
	municipalities with lamprey fishing areas	41	16
Gender	Riga and Pieriga region	257	50
	Male	240	47
	Female	271	53
Age	under 35	176	34
	36-50	148	29
	51-65	156	31
	over 65	31	6
Average income per person per month	up to 300 EUR	115	22
	301 – 700 EUR	196	38
	701 – 1500 EUR	155	31
	over 1500 EUR	45	9
Habit to eat (have tasted at least once) lamprey	yes, and I have them in my diet	242	47
	yes, but I haven't them in my diet	212	42
	no	57	11

In case of Lithuania the local residents' survey was carried out both directly, during the meetings with project stakeholders, and indirectly, using online form of questionnaire and reaching residents by e-mail. In total 80 residents have participated in the survey (see table 1.3).

Table 1.3. General characteristics of the survey respondents in Lithuania

Characteristics		Respondents	
		persons	% of total
Region	Klaipeda City Municipality	43	53.8
	Klaipeda District Municipality	8	10
	Neringa Municipality	8	10
	Kretinga District Municipality	5	6.3
	Palanga Municipality	10	12.5
	Silute District Municipality	3	3.7
	Skuodas District Municipality	1	1.2
	Telsiai District Municipality	2	2.5
Gender	Male	34	42.5
	Female	46	57.5
Age	Under 20	1	1.3
	20-35	38	47.5
	36-50	29	36.3
	51-65	10	12.5
	over 65	2	2.5
Average income per person per month in the household	up to 200 EUR	2	2.5
	201 – 500 EUR	11	13.8
	501 – 800 EUR	26	32.5
	801 – 1200 EUR	20	25
	over 1200 EUR	21	26.2
Habit to eat (have tasted at least once) lamprey	yes, and I have them in my diet	5	6.3
	yes, but I haven't them in my diet	37	46.3
	no, but I would like to try them	26	32.5
	no, and I don't want to try them	12	15

Sociodemographic characteristics of residents were identified and explored in order to evaluate the profile of typical inhabitant of the region. Information about resident profile includes lamprey consumption traditions and habits, change in behaviour and reasons that motivate them. Opinion questions asked concerned welfare affecting aspects, significance of lamprey preservation. Analysis was undertaken concerning how these variables are dependent on different types of residents (according to their sociodemographic features), and how the typology of residents helps to predict activity behaviour. To investigate these issues, the analysis relied mainly on the use of descriptive statistics and frequency analyses with categorical data processing methods such as Pearson χ^2 -testing (cross tabulation) and nonparametric statistical tests (such as correlations and analysis of variance). For the analysis of the relationship between two variables with two categories each (for example, gender and age), resulting in a 2 by 2 table, the output reported from Pearson χ^2 -testing includes an additional correction value (Yates' Correction for Continuity), designed to compensate for an expected overestimation of statistical significance for small data (Siegel, 1956). For all statistical analyses, the software IBM SPSS Statistics 24 was used and only results with statistically significance level of 5% were reported in this chapter.

Overview of descriptive statistics of respondents' characteristics. Std Dev: Standard deviation:

	N	Mean	Std. Deviation
Age	80	2,68	,808
Gender	80	1,57	,497
Number of persons in a household	80	2,82	1,199
Average household income pers/m	80	3,64	1,070
Municipality	80	2,44	1,941
Consumption of the lamprey/lamprey products in your household	41	1,44	,673
Possible changes in consumption if lamprey product price would fall by 25%	41	1,39	,771
Frequency of lamprey consumption	8	2,50	,756
Change in lamprey eating habits during last 3 years	8	2,50	1,069
Significance of lost for nature, if the lamprey disappeared in the Baltic Sea	80	2,63	,877

Data source: authors' calculation based on the residents' survey results, 2019

Methodologically, the survey both in Latvia and Lithuania is a partial observation of the general population, however, its implementation follows the principles of sampling. The number of the answers achieved and representativeness of the survey results obtained allow to use the survey results in this study to gain a general view of the general population. Nevertheless, the survey results are not generalized in the report - wherever it was relevant, the survey was cited as a source of information. For the conclusions, the survey data were analysed both independently and in relation to each other.

Statistics

The study analysis the following quantitative information:

- 1) statistical data available from databases of Central Statistical Bureau of Latvia and Statistics Lithuania Official Portal on the population dynamics and structure in region, economic activity, and industries covering time period since 2015.
- 2) data from The Latvian Rural Advisory and Training Centre for analysis of fishery statistics and processing (Latvian Fisheries Yearbooks, individual statistics) in Kurzeme region for the period since 2010.
- 3) data from Ministry of Environment of Lithuania and Ministry of Agriculture of Lithuania for analysis of fishery statistics in Lithuania for the period since 1980.
- 4) Published statistical information from State Environmental Service of Latvia about illegal lamprey caches in Latvia.'
- 5) Official statistics obtained from Eurostat, FAO.

The most recently released statistical data have been used for the analysis, in most cases statistical data were available for 2017 and 2018¹.

Publications

Regarding the assessment of the environmental aspects and also for the obtaining of qualitative information, the reports of previous research, policy planning documents as well as publications of Latvian, Lithuanian and foreign researchers regarding topic (see bibliographic list) have been used in the study.

Success and limiting factors

Data availability became the biggest challenge for the study. The study widely relies on the information from interviews and residents' survey, which both add value to the findings of the study and impose limitations, as reliable data such as the costs and profitability of lamprey fishing, the costs and amount of lamprey processing, etc., that stakeholders considered sensitive and didn't share during the interviews, were not available.

Other limitation of the study was the difference between the amounts of data in Lithuanian study area compared to the Latvian study part. As the lamprey is not as well-known fish and also not widely used in Lithuania, data is scarce and respondents participating in survey and interviews cannot fully participate applying the developed methodology. Also, in the Lithuania, while reporting fishermen are not always fully reporting the correct amounts of their lamprey catch as well as the selling prices. As far as the data goes, there are differences in reporting in both countries, creating further difficulties to data comparability. However, the study opens new possibilities to the Lithuanian side of businesses development and opportunities for the residents to explore lamprey and its products in the future.

1.2. Methodological framework

Appropriate quantitative and qualitative analytical methods have been used for this social and economic assessment and for the purpose of the study. As stated above, such sociological and statistical research methods for information gathering as document analysis, expert survey or structured interview, survey, as well as compilation and grouping of statistical data were used.

Time series analysis, trend analysis, structure analysis, comparative analysis, calculation and analysis of productivity and averages were used in the analysis of socio-economic indicators and impact assessment and logically constructive and graphical method for the presentation of the research results in the report.

Two main methodological approaches are used in this social and economic study. The analysis of the current socio-economic situation in Kurzeme region and Klaipėda country is based on a thematic approach. Also the analyses of market related, cultural and environmental aspects of lamprey industry in the region is carried out in accordance with the thematic approach in the framework of value added chain - identifying social, economic and environmental values generated by the lamprey industry in different product value-creating stages, beginning with stock and ending with the product consumption. In its turn, the assessment of the importance of lamprey stock and fishery to the region is based on the approach of ecosystem services assessment.

The approach of ecosystem services assessment allows to focus on the social, economic and environmental benefits that are generated by the lamprey industry to the local society. Following the

¹ Statistics collected for assessment September – October 2019.

latest research findings on the classification of ecosystem services, three groups of ecosystem services are identified:

- regulating and maintenance services (non-anthropocentric value) means ecosystem services that are associated with an ecosystem process itself, related to the value of the nature that is centred on something other than human beings;
- provisioning services (instrumental value) means ecosystem services than are associated with all the products (material benefits) that are obtained from the ecosystem and can be consumed by human;
- cultural services (relational value) means intangible benefits of an ecosystem that affects a person's physical and mental condition and is symbolic, cultural or intellectual cultural services, such as an environment for recreational activities that provide physical exercise and mental well-being and which are not easily quantifiable in monetary terms^{2 3}.

For the purpose of the study the theoretical classification of the ecosystem services is used to group the social, economic and environmental benefits related to the lamprey industry that are identified during this study to characterize the importance of the lamprey stock and fishery to the region.

Description of the thematic approach

Kurzeme region (the Project area in Latvia) being 13.6 thsd. km² (about 1/5 of Latvia's territory) is divided into 20 local municipalities, including two cities under state jurisdiction: Liepāja and Ventspils; and 18 countries: Alsungas, Kuldīga, Skrundas, Grobiņas, Rucavas, Nīcas, Priekules, Vaiņodes, Durbe, Pāvilostas, Aizputes, Saldus, Brocēnu, Dundagas, Talsu, Rojas, Ventspils and Mērsraga country. For the purpose of the study, where the availability of statistical information allows, the social-economic situation is analysed separately for the coastal municipalities, municipalities where lamprey fishing appears and other municipalities of Kurzeme region (see table 4) to characterize the similarities and differences in local level.

Table 1.4. Grouping of municipalities for the social-economic situation analyses in Kurzeme region

Municipality	Coastal municipality	Lamprey fishing area
Liepāja	Yes	No
Ventspils	Yes	No
Aizpute municipality	No	No
Alsunga municipality	No	No
Brocēni municipality	No	No
Dundaga municipality	Yes	No
Durbe municipality	No	No
Grobiņa municipality	Yes	No
Kuldīga municipality	No	Yes
Mērsrags municipality	Yes	Yes
Nīca municipality	Yes	No
Pāvilosta municipality	Yes	Yes
Priekule municipality	No	No
Roja municipality	Yes	Yes
Rucava municipality	Yes	No
Saldus municipality	No	No
Skrunda municipality	No	No
Talsi municipality	Yes	No
Vaiņode municipality	No	No
Ventspils municipality	Yes	Yes

Source: CSB, 2019

² AKTiVS, 2018

³ Pascual A. Et al., 2017

The report comprehensively represents Lithuanian situation covering lamprey fishing areas of Klaipeda and Telsiai counties are located in the western part of Lithuania at the coast of the Baltic Sea. The territory is covering 9 572 km² amounting to 14,66% of Lithuania's territory. The entire Lithuania's Baltic Sea coastline – 90,66 km belongs to the study territory (with fishing in Nemunas downstream and Curonian lagoon). Study area consists of Klaipeda county and Telsiai county. Klaipeda County unites 7 municipalities: Klaipeda, Klaipeda district, Neringa, Palanga, Kretinga district, Silute district and Skuodas district municipality. Telsiai County is smallest of the 10 counties and unites 4 municipalities: Mazeikiai district, Plunge district, Rietavas and Telsiai district municipality.

The study area includes three lamprey fishing grounds: Curonian Lagoon, Svetoji River, Nemunas River Delta.

For the assessment of social and economic situation in Project areas of Latvia and Lithuania the following indicators were analysed:

Assessment	Social-economic indicators	Source of information
Population structure and population dynamics in the region	<ul style="list-style-type: none"> - Population (average of the year), thsd. - Population density pers./km² - Population at working age (15-64), thsd. 	CSB Latvia, Stat Lithuania
Employment rate and sectoral structure in the region	<ul style="list-style-type: none"> - Active population at working age (15-64), thsd. - Employment rate - Sectoral structure of employment - Level of incomes - Economic strain among persons (%) 	CSB Latvia, Stat Lithuania
Economic activity in the region	<ul style="list-style-type: none"> - Number of economically active enterprises and the structure by size and main economic activity - Fishing activity and food processing (number of enterprises, number of employees, incomes) - Other lamprey related economic activities (number of enterprises, number of employees, incomes) 	CSB Latvia, Stat Lithuania
Local public opinion on the factors of quality of life in the region	<ul style="list-style-type: none"> - Long-term net migration of population - Factors of quality of life - Local residents' opinion on the factors of quality of life 	CSB Latvia Publications Residents' survey results

Approach for the analyses of importance of the lamprey stock to the region

The thematic approach of value chain was used for analysing the importance of the lamprey stock and fishery to the region - identifying social, economic and environmental values generated by the lamprey stock and fishery in different value added-creating stages, beginning with the stock and ending with the consumption of the lamprey products (see Table 1.5).

Table 1.5. Framework for the analyses of importance of lamprey stock to the region

Impacts		Value chain			
		Stock	Production	Processing	Consumption
Environmental	Protection of the species				
	Anthropogenic impact				
	Monitoring and restocking				
Social	Traditions and attitudes				
	Lamprey related sectors				
	Potential to develop				
Economical	Market participants				
	Market size				
	Demand and consumption				
Estimates	Quantitative description, includes a lot of statistics, few/no of assumptions	Qualitative description, includes few statistics and qualitative information from different sources		Qualitative description based on the interviews or survey	Not included in study

For the assessment of social and economic importance of lamprey stock and fishery to the Project areas of Latvia and Lithuania the following indicators were analysed:

Assessment	Social-economic indicators	Source of information
Lamprey as a resource for economic activity in the project area	<ul style="list-style-type: none"> - Characteristics of lamprey fishing - Processing of lamprey and production of lamprey products - Market of the lamprey products, demand and consumption 	CSB Latvia, Stat Lithuania, Fisheries Yearbooks, individual fishing statistics, interviews,
Social aspects of the use of lamprey	<ul style="list-style-type: none"> - Cultural-historical significance of lamprey fishing and consumption: traditions and attitudes - The potential of lamprey and its products in the tourism 	Interviews, BIOR unpublished information, residents' survey
Environmental aspects of the use of lamprey stocks	<ul style="list-style-type: none"> - lamprey stock as a part of local biodiversity - anthropogenic impact on lamprey stock - conservation and management of lamprey stocks 	Publications, Interviews, residents' survey

2. Socio-economic characteristics of the region

2.1. Trends of social and economic development in Kurzeme region

The Kurzeme region is located in the western part of Latvia on the coast of the Baltic Sea. It has a great diversity of natural and cultural landscapes and values: cities and rural area, beaches, steep banks, dunes and coastal villages. The region borders with Lithuania, as well as Zemgale and Riga regions.

The main economic development centres of Kurzeme region are two major cities (Liepāja and Ventspils) and three smaller cities – the centres of polycentric development (Kuldīga, Saldus, Talsi). These centres concentrate economic activity in the region, as well as social activities, access to health and social services, and public services. All five cities are located relatively far from the capital of Latvia Riga (117 - 216km), which determines that their role in the development of the rural areas of the region is highly important.

Kurzeme region with population of 242 thsd. (12.6% of the total in Latvia) in 2018 and average density 17.8 pers./km² (10 pers./km² in the territory outside two largest cities) is a sparsely populated area, less than Latvia average. The population density of the region both in the cities and rural area is falling due to the reduction in the number of inhabitants (see table 2.1).

Similar to other regions of Latvia and other Eastern Europe countries, population number in Kurzeme region has been affected by large-scale external and internal migration (since joining the EU in 2004 to 2018) focused on the movement into developed countries/cities of Latvia and accelerated by high mortality and low birth rates. The population decline in Kurzeme region is higher than Latvia average, but lower than in Vidzeme and Latgale regions. The population density in the coastal rural municipalities (Liepāja and Ventspils excluded) and municipalities with lamprey fishing areas in Kurzeme region is under the average. Also, the tendency of declining population in the Kurzeme region is more pronounced than the average (drop of 5.4 – 5.8% versus 4.5% 2018/2015, see Annex 5).

Table 2.1. Social indicators of Kurzeme region and Latvia average

	Kurzeme region			Latvia
	2015	2018	2018/2015	2018/2015
Area, thsd. km ²	13.6	13.6	X	X
Population (average of the year), thsd.	252.	241.6	-4.5%	-3%
Population in cities under state jurisdiction, share of total	42%	43%	X	X
Population density in cities under state jurisdiction, persons per km ²	849	823	-3%	X
Population density in counties, persons per km ²	11	10	-6%	X
Population at working age (15-64), thsd.	163.1	152.4	-7%	-4%
Active population at working age (15-64), thsd., including	117	114	-2%	-2%
...employed, thsd.	104	105	1%	1%
...unemployed, thsd.	13	9	-28%	-26%

Source: CSB Latvia, 2019

Thus, both in the Kurzeme region and in the coastal municipalities, the population number dynamic of the last years points to the depopulation of the territories.

The population structure in Kurzeme region is characterized as aging, this tendency is observed in the whole territory of Latvia, however the demographic load in Kurzeme region is higher than the Latvian

average (accordingly 63% and 65% in 2019) and it has been increasing since 2015. While the demographic load has increased in Latvia on average due to the increase in the number of children and decrease in the number of population at working age and older people (persons above working age); the population of Kurzeme region is decreasing in all age groups, moreover, the population at working age has fallen more rapidly (decrease by 7%) than the number of persons above working age (decrease by 5%) or number of children (decrease by 3%). The population structure and demographic load in coastal rural municipalities and municipalities with lamprey fishing areas have not changed significantly - overall, these areas are experiencing population decline among all age groups.

An employment and access to the labour market are factors that are often mentioned as determinants for quality of life (Bela-Krūmiņa B., et al., 2006). 47% of population was economically active population of working age (15-64) – both employed and unemployed. The economic activity of the working age population in Kurzeme region is higher than the average in Latvia, it has increased since 2015 and makes 78% of the total population at working age (15-64). Employment rate is 92% of economic activity in Kurzeme region, and it is raising during last years both as a proportion and in absolute terms (CSB, 2019).

Natural persons – performers of economic activity make almost a half of all economically active unions in Kurzeme region and the number is growing. Also the number of peasant and fishermen farms is growing (see table 2.2.). The share of economically active persons (employees and self-employed natural persons) in the coastal rural municipalities and municipalities with lamprey fishing areas makes respectively 39% and 15% of the total economically active persons in Kurzeme region.

Table 2.2. Dynamic and structure of economically active enterprises in Kurzeme region

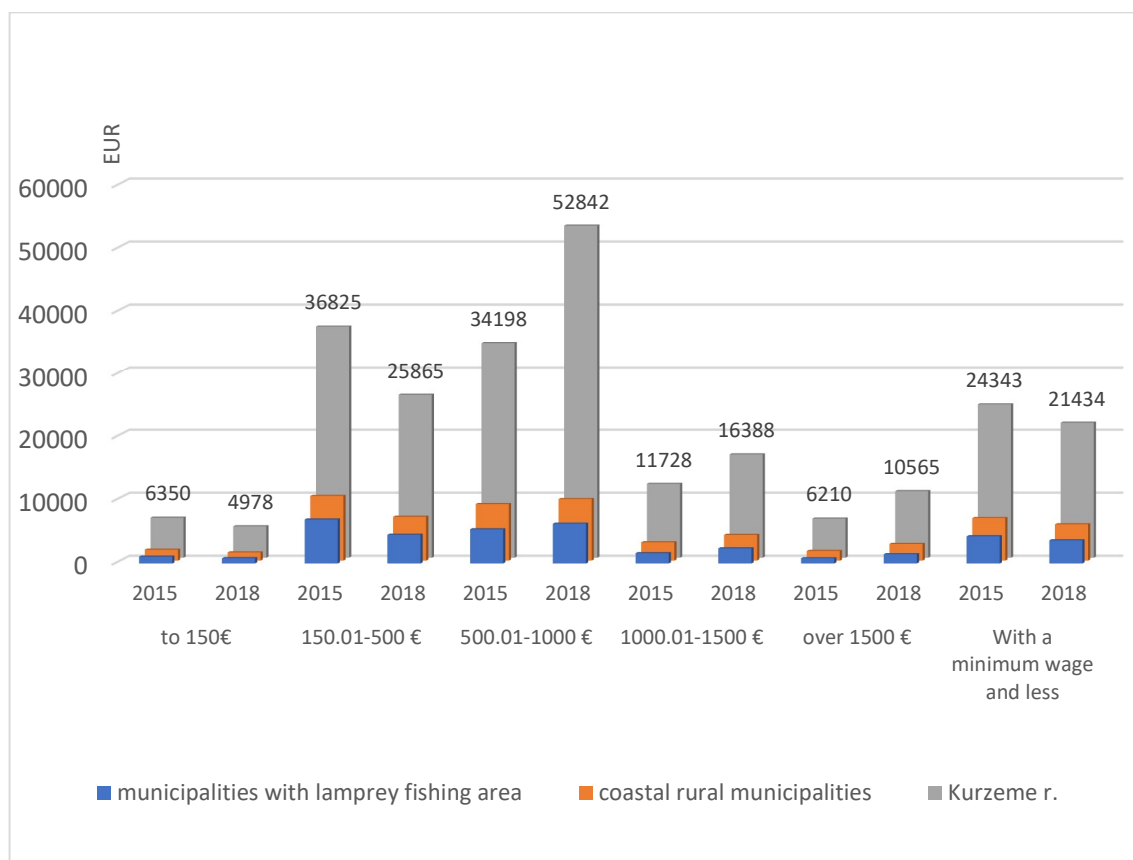
	2015	2017	2017/2015
Natural persons - performers of economic activity	8 916	9 473	106%
Peasant and fishermen farms	1 735	1 965	113%
Individual merchants	1 311	1 256	96%
Commercial companies (market sector)	6 933	7 150	103%
Funds, foundations and associations (market sector)	297	371	125%
Total	19 192	20 215	105%

Source: CSB Latvia, 2019

Although the population in the region is declining, economic activity is remaining or even growing in some municipalities. Since 2015, in average 2850 new companies enter the market in Kurzeme region annually. This is evidenced also by the dynamics of the number of economically active enterprises per 1000 inhabitants which has grown from 76 to 83 enterprises per 1000 inhabitants (+9%) in Kurzeme region in 2018/2015.

Employment is concentrated (95% of total) in micro enterprises up to 9 employees. Total number of enterprises up to 9 employees has increased and exceeds 19 thousand (+6% 2017/2015) while the number of companies employing 50 and more employees decreased from 193 to 178 (-8% 2017/2015) in Kurzeme region.

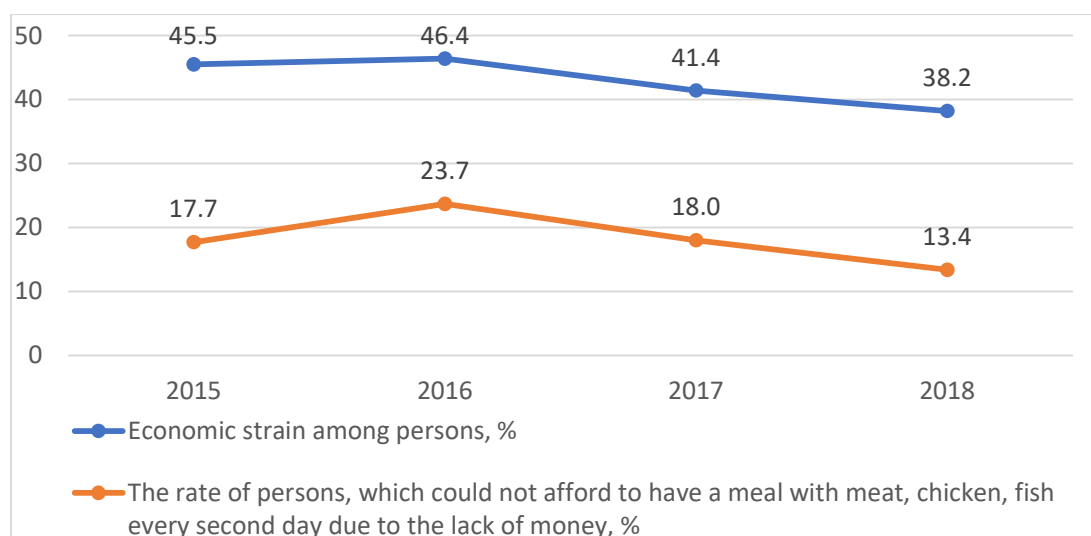
Comparison of Kurzeme region and Latvia (most recent data of 2018) shows that the average salary is lower by 15% (858 EUR vs 1004 EUR). However, since 2015, there has been a positive trend - the number of employees whose salary is equal to or lower than the minimum wage is decreasing (see figure 2.1).



Source: CSB Latvia, 2019

Figure 2.1. Breakdown of number of employees by monthly gross income in Kurzeme region

In its turn, the number of employees with a gross salary above EUR 500 per month is increasing both in Kurzeme region, coastal rural municipalities and also in the municipalities with lamprey fishing area. Moreover, the number of employees with gross salary over EUR 1000 per month has increased more rapidly than the number of employees in other groups (+50%) in the coastal rural municipalities and also in the municipalities with lamprey fishing area.



Source: CSB Latvia, 2019

Figure 2.2. Economic strain and material deprivation of population in Kurzeme region 2015 - 2018

As a positive result of increasing incomes should be noted that the rate of persons subjected to economic strain⁴ has been declining since 2016 in Kurzeme region (see figure 2.2). In 2018 13.4% of persons were not able to cover costs of a meal with meat, chicken or fish or equivalent vegetarian meal every second day, compared to 17.7% in 2015. Economic strain is still high among older persons – according to the statistics, one of two persons older than 65 (48.1% in 2018) feels economic strain in Kurzeme region.

The analysis of the number of employed by type of activity shows that Kurzeme region has higher employment in the primary sector (A) compared to the average in Latvia (7% in Latvia; 11.8% in Kurzeme). The share of the employed in the manufacturing (B-E) also is higher in Kurzeme than the in Latvia average (respectively 20% and 15%), but the share of the employed in service sector (G-N) in Kurzeme is lower compared to the Latvia average (see table 2.3).

It should be noted that, in contrast to the average trend in Latvia, employment in the primary sector and manufacturing in Kurzeme has increased in 2018 compared to 2015, indicating the importance of the real economy sectors in the region. The share of the employed in service has decreased since 2015, which is quite understandable trend, considering the population declining in Kurzeme region.

Table 2.3. The structure of the employment in Kurzeme region and Latvia average in 2018

	Kurzeme region, %			Latvia average, %	
	2015	2018	2018/2015	2018	2018/2015
Employed population	100	100	X	100	X
(A) Agriculture, forestry and fishing	11.8	11.8	2%	7.0	-11%
(B-E) Manufacturing, mining and quarrying, other industry	19.0	20.5	9%	15.4	0%
(F) Construction	9.0	8.2	-7%	8.2	4%
(G, I) Trade, accommodation and food service activities	16.0	14.4	-9%	18.9	8%
(H, J) Transportation, storage, information and communication	12.0	10.1	-16%	12.1	-1%
(K-N) Financial, insurance, scientific, administrative and real estate activities	6.6	6.7	3%	11.5	3%
(O) Public administration and defence; compulsory social security	5.9	6.5	13%	6.5	0%
(P) Education	10.1	10.3	4%	9.2	0%
(Q) Human health and social work	5.5	6.7	26%	6.1	0%
(R-U) Other services	4.2	4.5	11%	5.0	9%

Source: CSB Latvia, 2019

For the purpose of the study, the industries which gain or potentially may gain from lamprey stock and lamprey fishing (related industries) were defined. Given the fact that NACE framework is used for

⁴ Households which give a negative answer to at least two questions about household's ability to cover the following costs: utility costs, rent and credit payments (including loans and purchase instalments for purchase of goods); keeping the dwelling warm; unexpected expenses covered from own resources; a meal with meat, chicken or fish or equivalent vegetarian meal every second day; one week annual holiday away from home.

statistical collection, presentation and classification of economic activities, each related industry was accorded to its NACE code (see table 2.4.).

Table 2.4. Industries that are related to lamprey stock or lamprey fishing in Kurzeme region, 2018

NACE 2.red	Related industry	Economically active enterprises of market sector	Occupied posts (number of employed)	Average monthly gross wage (EUR)
A03	Fishing and aquaculture	108	469	680
C10	Manufacture of food products, including processing and preserving of fish, crustaceans and molluscs	162	2834	573
I55	Accommodation Including hotels, camping grounds, short-stay and other accommodation	218	653	536
I56	Food and beverage service activities, including restaurants and mobile food service activities, event catering and other food service activities	298	2404	468
R93	Sports activities and amusement and recreation activities	417	593	656
Kurzeme region total		20 215	79 559	775

Source: authors' calculation according to CSB Latvia, 2019

In 2018 there were 1 203 economically active enterprises of market sector with main economic activity which possibly could be related to lamprey industry. Despite the fact that there were only 2 companies with more than 250 employees, the share of enterprises with more than 10 employees (medium companies) is more important than in the region average (13% vs 5%). Average salary was below the region's level in all lamprey-related industries – close to average in fishing and aquaculture (-7%), below in food and beverage service activities and sports activities and amusement and recreation activities (-16%; -17%) and substantially below in manufacture of food products and accommodation (both – 23%).

2.2. Fishing and fish processing in Kurzeme region

Kurzeme region's fishermen fish in the Baltic Sea and the Gulf of Riga (coastal and by offshore), as well as in inland waters (rivers and lakes). The size of the sector and its future development possibilities are entirely determined by the fish resources available for fishing, reflecting the fish stock status in the Baltic sea. The total catches in the Baltic Sea (coastal and by offshore) and inland waters have increased slightly in 2018/2015 (see table 2.5). The rise of coastal catches happened because the catches of round goby have increased rapidly in 2018 compared to the previous years.

Table 2.5. Latvian catch in the Baltic Sea and in the inland waters (tonnes), 2015- 2018

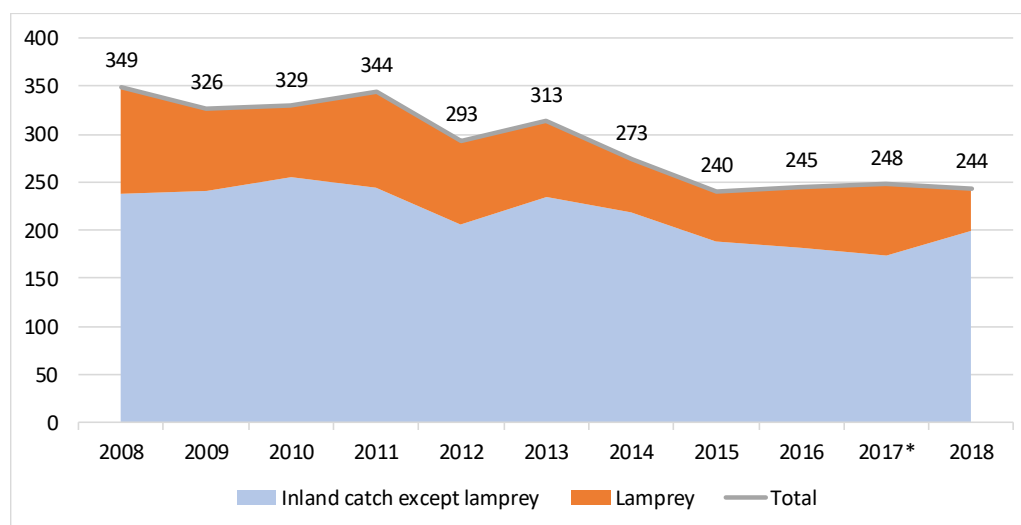
	2015	2016	2017	2018	2018/2015
The Baltic Sea and the Gulf of Riga, TOTAL	62 633	60 433	67 381	70 431	12%
The Baltic Sea and the Gulf of Riga, by offshore	60 007	56 611	63 882	66 180	10%
The Baltic Sea and the Gulf of Riga, coastal fishery	2 626	3 822	3 499	4 251	62%
Inland waters	240	245	248	244	2%

Source: authors calculations based on Latvian Fisheries Yearbook 2019, BIOR

According to information available in public databases, Kurzeme region's share in Latvian fishing industry can be assessed to be 81% - 87% (81% of registered vessels (60), 84% of aggregated industry net turnover (53.7 M EUR), 85% of employees (633), 87% of the number of companies, fishing by offshore in the Baltic Sea and Gulf of Riga(32))⁵. More than half of Kurzeme region's largest fishery companies are registered in Liepaja – 12 companies with 164 employees and aggregated net turnover 30.1 M EUR. Ventspils city is the main working place accounting for 299 people or 47% of all Kurzeme region's employees operating in fishery, however aggregated net turnover of 3 Ventspils' fishery companies is 16.7 M EUR. Microenterprises dominates in fishing sector in Kurzeme region.

There are 143 legal persons licenced to fish in the Baltic sea and Gulf of Riga coastal zone, 62 of which are located in the Kurzeme region. The coastal fishermen of Kurzeme region have 176 boats at their disposal, which is almost half (46%) of the total number of boats registered in Latvia for coastal fishing. If fishing in the Baltic Sea by offshore is licensed for commercial purposes only, coastal and inland fishing may also be authorized for self-consumption.

River lamprey is one of the most important inland species with 26% 10-year average share of total inland catch (fluctuating 18% to 32%), second place is for bream (21%), following by pike, tench and pike-perch (10 – 12% for each species). Although, the volume of inland catch is decreasing, the fall of lamprey is swifter than other species (see figure 2.3).



Source: authors' calculation according to Latvian Fisheries Yearbooks 2019, BIOR

Figure 2.3. Inland catch of lampreys and other inland fish species in Latvia, tons 2008 – 2018

The fishery in the Baltic Sea and the Gulf of Riga by offshore provides raw material (previously herring, sprat and cod in small amounts; the quota for cod is dramatically reduced for the next years, due to the critical situation with the cod population in the Baltic Sea) for the fish processing industry.

The coastal and inland fishery is small- scale business and can provide different species of fish (herring, sprat, cod, salmon, flounder, turbot, sea trout, European eel, pikeperch, whitefish, bream, European smelt, eelpout perch etc.) for small local processing units or home producers.

Fish processing knowledge and traditions in Latvia were able to develop due to the fishing in the Baltic Sea and the Gulf of Riga. The fish processing industry is one of the few Latvian food sectors with a positive foreign trade balance and many years of experience working in export markets. In the current context of declining fish stocks in the Baltic Sea, the fish processing industry needs to restructure to

⁵ Calculations based on FVS information (09.2019), MoA information (09.2019) and published annual reports of companies (www.firmas.lv)

other fish species for production. A number of companies have successfully completed such restructuring and may become the backbone of the fish processing industry's future development in Latvia.

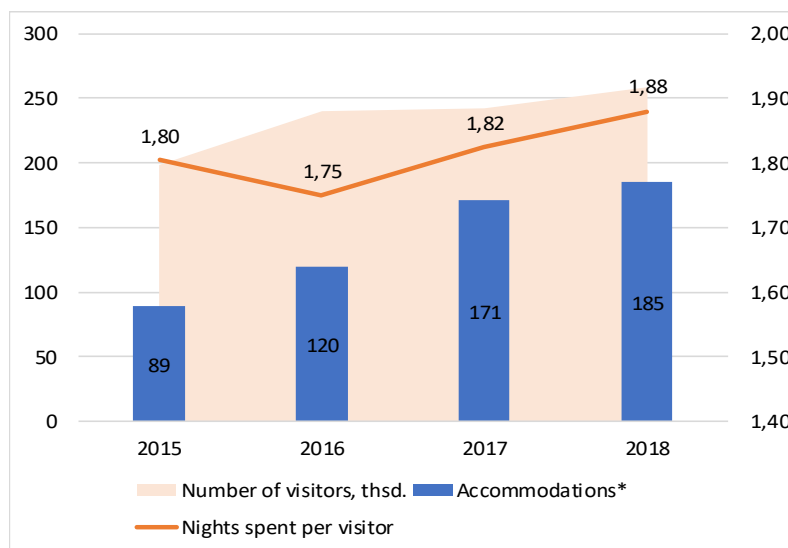
In total, there are 108 fish processing companies in Latvia with 3 thousand employees and turnover 198 M EUR in 2018. Out of which 33 fish processing companies and 23 home producers who processes fish at home or small-scale production units are located in Kurzeme region (FVS as on 18.09.2019).

Roja municipality is the main fish processing area of Kurzeme region – accounting for 26% (9.0 M EUR) of total fish processing net turnover of Kurzeme region's companies (34.5 M EUR in 2017) and 35% of employees (391). Fish processing sites in Ventpils city employ 334 people and account for 24% of fish processing share in Kurzeme region. Taking into account that in 2017 the total value of fish product manufacturing was very close to total the turnover of fish processing companies', Kurzeme region's share can be assessed to be 25% of Latvia total fish product manufacturing or 33.3 M EUR. Smoked salmon, prepared or preserved sardines, sardinella, brisling, sprats and mackerel are the main manufactured fishing products (84 M EUR or 62% of total fish production in Latvia in 2017).

Small local home producers are located throughout the coast, more concentrated at the side of the Gulf of Riga, near Riga. Processed products (mostly smoked fish) are made available by the producers themselves, in specialized fish shops, for example in Pāvilosta, Roja, Lapmežciems, or in largest (nearest for the producer) towns of the Kurzeme region or in Riga.

Although availability of fish is limited, coastal and inland water fishing and local processing of fish is a resource for developing tourism and recreational activities in the Kurzeme region. For centuries, fishery has shaped buildings, traditions and landscapes in Kurzeme region, which today should be considered a coastal cultural heritage and can also be used as a resource for the development of the tourism and recreation industry.

Tourism industry in Kurzeme region has increasing trend – number of all-year available accommodations doubled in last 4 years, number of visitors rose by 30% and the share of foreign visitors reached 33% (see figure 2.4).



Source: CSB Latvia, 2019

* - Accommodations at the end of year, accommodations closed in low season are not included

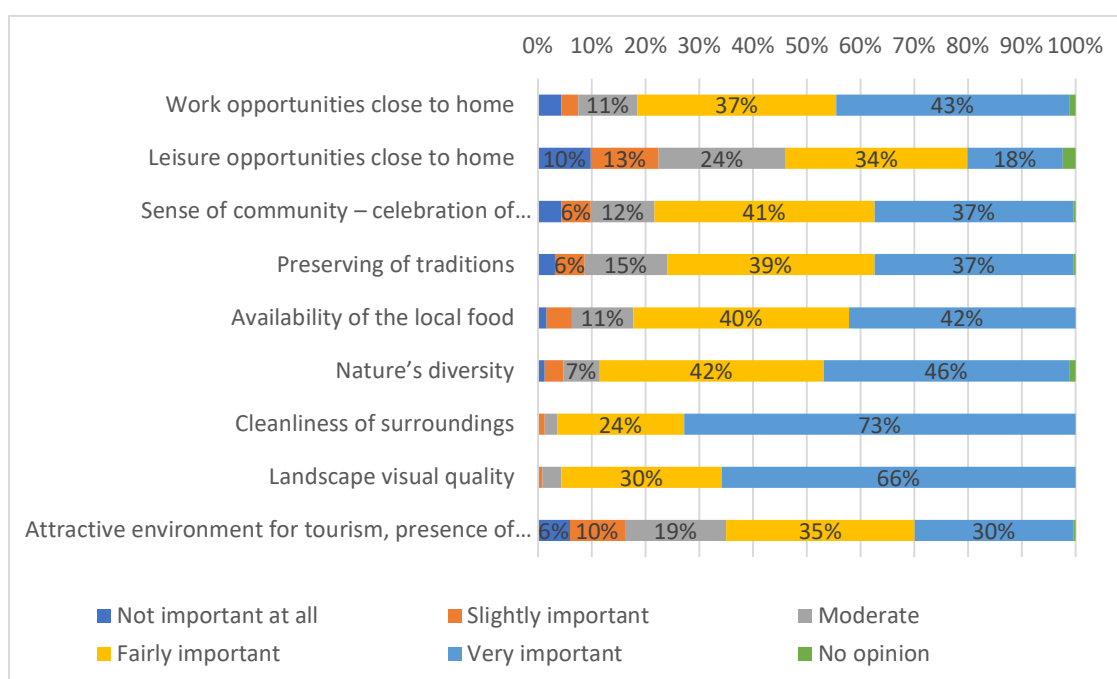
Figure 2.4. Main tourism industry indicators in Kurzeme region in 2015 - 2018

82.5 thsd. out of 258.5 thsd. Kurzeme region's visitors (2018) accommodated near lamprey spots, 24% of them were foreign tourists. 91 accommodations are located in the municipalities with lamprey catch spots - half of all Kurzeme region's accommodations (2018). The trend of nights spent there is also slightly increasing (1.61 nights per visitor in 2018 vs 1.58 in 2016), however much less than Kurzeme region's average.

2.3. Local opinion on factors of life quality in Kurzeme region

Quality of life is a broad, multidimensional concept that covers all aspects of life and is affected by wide number of objective (external environment) and subjective (private attitude) factors. The study conducted in 2006 (Quality of Life Index in Latvia) includes the following aspects for evaluation of the quality of life: material well-being; employment and access to the labour market; education and knowledge; health and social security; physical security; family; involvement in and participation in processes and recreation (Bela-Krūmiņa B., et al., 2006).

The analysis of trends of social and economic development gives an insight into the external conditions for the living in Kurzeme region, but for the purpose of this study it was important to characterize also the local residents' opinion (private attitude) of the factors of quality of life that are important for them, to find out the possible relationship among those factors and lamprey stock being in the region. The results of residents' survey were used to evaluate the local public opinion on the factors of quality of life in Project areas in Latvia and Lithuania. The respondents could express their attitude on defined factors of quality of life, by answering the question "*how important to your welfare and life quality are following aspects of your life*". According to the results from Latvia's survey (see figure 2.5) the most important factors of life quality are related to the nature values surrounding the place of residence.



Source: authors' calculation based on the residents' survey results, 2019

Figure 2.5. Local residents' opinion on the factors of life quality in Kurzeme region

Almost all respondents have pointed that *landscape visual quality* and *cleanliness of surroundings* are fairly or very important aspects for their life quality and more than ¾ of respondents have mentioned *nature's diversity* as highly important life quality factor.

Also, more than ¾ of respondents have mentioned *work opportunities close to home*, *availability of local food*, *maintenance of local traditions* and *sense of community* as fairly or very important factors. Only leisure possibilities close to home and attractive environment for tourism have been less important to the respondents of Kurzeme region (still having high importance evaluation by more than a half of respondents).

2.4. Trends of social and economic development in Klaipeda and Telsiai counties

The following section describes characteristics of the socio-economic situation in Klaipeda County and Telsiai County. Various socio-economic indicators were assessed to characterize the socio-economic situation of the study area. The main data source is national statistics from 2015-2018 (2019 if available).

Lithuania is located in north-eastern Europe on the eastern coast of the Baltic Sea. It shares borders with Latvia (588 km), Belarus (660 km), Poland (103 km), and Russia – Kaliningrad (273 km). The Klaipeda and Telsiai counties are located in the western part of Lithuania at the coast of the Baltic Sea. The territory is covering 9572 km² amounting to 14,7% of Lithuania's territory. The entire Lithuania's Baltic Sea coastline is 90,7 km.

The study area consists of Klaipeda County and Telsiai County. Klaipeda County unites 7 municipalities: Klaipeda, Klaipeda district, Neringa, Palanga, Kretinga district, Silute district and Skuodas district municipality. Telsiai County is smallest of the 10 counties and unites 4 municipalities: Mazeikiai district, Plunge district, Rietavas and Telsiai district municipality.

Population in the area amounts to 450.6 thsd. residents, which is 16% of the Lithuania's inhabitants. The average density is declining. In 2018 was 60.8%/30.8% respectively for Klaipeda county and Telsiai county (see table 2.6).

Table 2.6. Social indicators of the Klaipeda un Telsiai counties and Lithuania, 2017

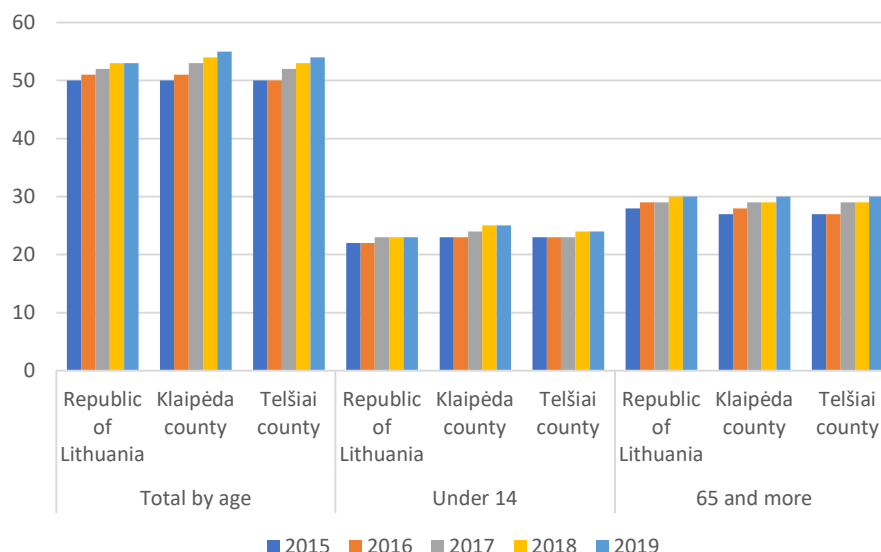
	2015	Region 2017	2017/2015, %	Lithuania 2017/2015, %
Area of the region, km ² Klaipeda/ Telsiai	5 222/ 4 350	5 222/ 4 350	-	-
Population (average of the year) Klaipeda/ Telsiai	325 959/ 142 402	317 487/ 133 110	-2.6/ -6.5	-4.4
Population density, pers./km ² Klaipeda/ Telsiai	62.7/ 33.0	60.8/ 30.8	-3.0 /-6.7	-3.8
Population at working age (15-64), Lithuania thsd.	1468.9	1464.8	NA	-0.3
Economically active population at working age (15-64), thsd. Klaipeda/ Telsiai	75.5/ 71.9	75.7/ 76.6	0.3/ 6.5	4.3
...employed Klaipeda/ Telsiai	163.7/ 63.3	151.2/ 66.0	-7,6/ 4.3	3.0
...unemployed Klaipeda/ Telsiai	104.6/ 46.7	112.3/ 40.6	7.4/ -13.0	-9.76

Source: OSP Lithuania, 2019

The information collected (see table 2.6) cover the social indicators which present the characteristics of the population structure, dynamics and employment rate in the Klaipeda and Telsiai Counties since 2015. The study area territory covers 5222 km² of Klaipeda and 4350 km² of Telsiai. Since 2015 until 2018 the population (average of the year) decreased by -2,6% in Klaipeda and -6,52% in Telsiai which is following the trend and is close to overall population decrease in Lithuania (-4,35%). Accordingly, the population density was affected and decreased from 62,7 pers./km² to 60,8 pers./km² (-3,03%) in Klaipeda (the same situation is in Lithuania -3,8%) and from 33,0 pers./km² to 30,8 pers./km² (-6,66%). The Statistics Lithuania OSP indicates that the population working age is 15-64 in Lithuania and since 2015 it decreased by 0,3% in 2018 (from 1468,9 thsd. to 1464,8). Unfortunately, there is no such a detailed data about the population working age in the study area but the economically active population at working age (15-64) indicator show growing tendency (2015-2018): 75,5 thsd. to 75,7 thsd. in Klaipeda (by 0,26%) and 71,9 thsd. to 76,6 thsd. in Telsiai (by 6,53%). Also, the indicator shows

positive effects and increased by 4,3% in Lithuania. Furthermore, the number of employed persons decreased by 7,63% in Klaipėda, which is 151,2 thsd. in 2018. On the other hand, there is a positive increase in Telsiai (4,26%) and there is 66,0 thsd. in 2018. Moreover, since 2015 until 2018 the number of employed persons increased by 2,98% in Lithuania.

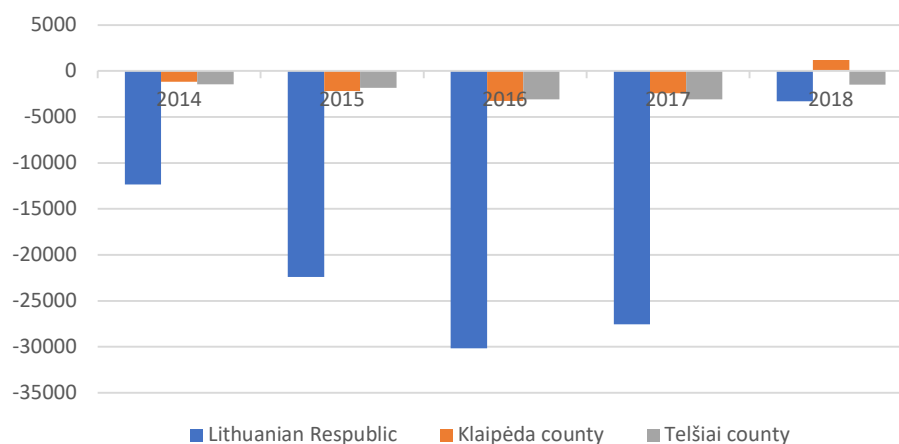
Index of ageing is constantly rising (e.g. 120 in 2018), but remaining quite low comparing to the rest of the country (131 in 2018). Median age of the population is the same as average of the country 43 years in 2018, although it is higher in case of women compared to men (46 and 40 years respectively).



Source: OSP Lithuania, 2019

Figure 2.6. Dependency ratio % at the beginning of the year in Klaipėda and Telsiai counties and Lithuania, 2015-2019

Overall one can observe a negative migration in Lithuania every year. However, the trend is changing and the magnitude of migration is becoming less and decreased by 88% in 2018 alone (see figure 2.7).



Source: OSP Lithuania, 2019

Figure 2.7. Net migration in Klaipėda and Telsiai counties and Lithuania 2014 – 2018, persons

When it comes to the research area, Klaipėda County has had a positive migration in 2018 and it was one of the counties that contributed to the positive trend. In the first days of 2020 we can draw a

conclusion that the change is due to the immigration of labour force from neighbouring countries. Thanks to the increased immigration we may soon observe its effect on average salary of Lithuania in general, as well as the study area.

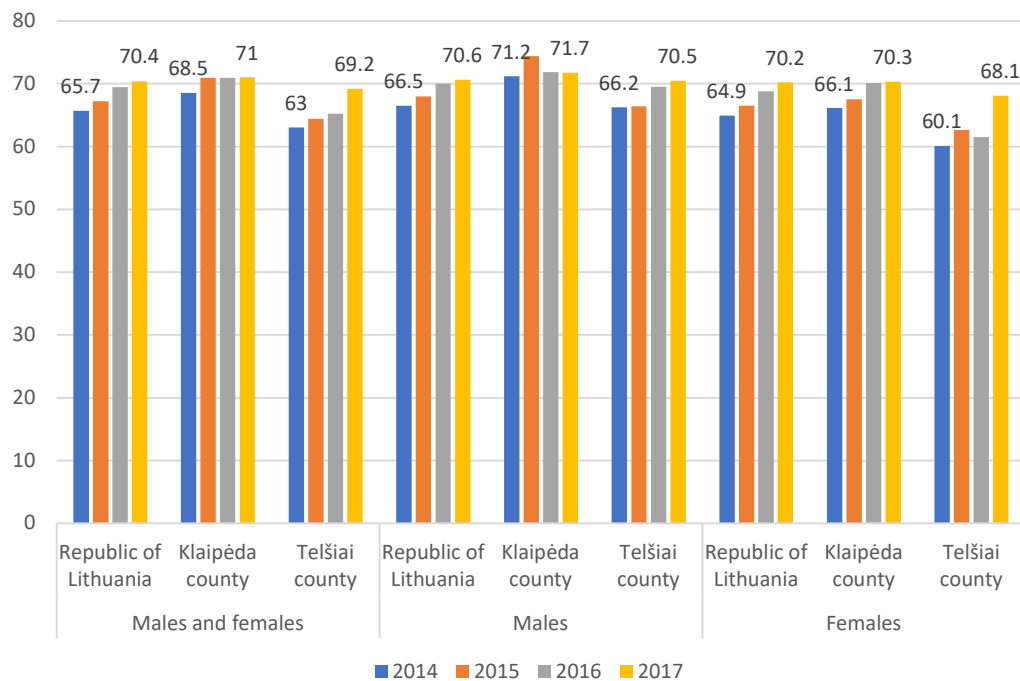
Table 2.7. Economic indicators for characteristics of the economic activity and structure in Klaipeda and Telsiai counties, 2017

	2015	Region 2017	2017/2015, %	Lithuania 2017/2015, %
Natural persons - performers of economic activity Klaipeda/ Telsiai	119 394/ 39 867	124 962/ 40 879	4,7/ 2,5	6
Forestry and fisheries Klaipeda/ Telsiai	1 408/ 931	1 439/ 873	2,2/ -6,2	-12,7
Individual merchants Klaipeda/ Telsiai	19 895/ 7 139	22 089/ 7 346	11,02 / 2,9	9,4
Commercial companies (market sector) Klaipeda/ Telsiai	8 844/ 2 626	9 457/ 2 889	6,93 /10,01	6,3
Micro (up to 9 employees) Klaipeda/ Telsiai	7 078/ 2 015	7 644/ 2 265	8 /2,41	10,6
Small (10-49 employees) Klaipeda/ Telsiai	1 482/ 493	1 518/ 505	2,4 /2,4	2,4
Medium (5-249 employees) Klaipeda/ Telsiai	250 / 105	262/ 104	4,8 /-0,95	1,4
Large (250 and more employees) Klaipeda/ Telsiai	34/ 13	33/ 15	-2,9/ 5,4	5,7
Employment concentration in micro enterprises (% of total) Klaipeda/ Telsiai	80/ 76,7	80,8/78,4	1,0/ 2,2	1,2
Average salary, EUR Klaipeda/ Telsiai	694,5/ 635,6	806,6/ 748,2	16,1/ 17,7	17,7

Source: OSP Lithuania, 2019

The economic indicators present the economic activity and structure in the study area (see table 2.7). The collected statistical data showed that there is positive increase by number of persons – performers by economic activity: since 2015 until 2017 it increased by 4,7% in Klaipeda and 2,5% in Telsiai which is close to the overall Lithuania indicator result – 5,95%. There is growing number of persons in the most of economic activities sectors of the study region, for instance, in Individual merchants; commercial companies (micro, small, medium and large). Unfortunately, in the forestry and fisheries economic activity the number of performers decreased by 12,7% in Lithuania. Consequently, the same situation is in Telsiai and it decreased by 6,2%. Slightly better situation is in Klaipeda because it increased by 2,2%.

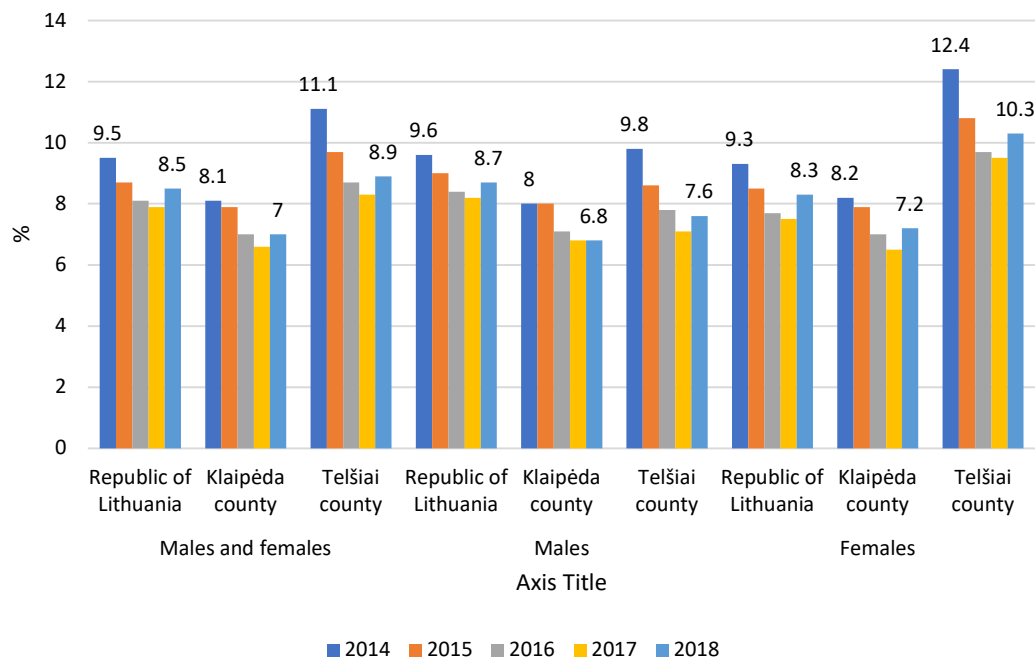
Employment rate remains quite stable across Lithuania throughout the period of 2014-2017 and varies around 70% (see Figure 2.8). A significant change can be observed in female employment rate rise between 2016-2017 from 61,5% to 68,1% in Telsiai county. Female unemployment rate is less sensitive to seasonality of work. The lowest number of working age persons (age 15-64) of Lithuania was registered unemployed in research area Klaipeda district (4,5 %), Neringa (4,7 %) and Kretinga (5,8 %).



Source: OSP Lithuania, 2019

Figure 2.8. Employment rate % (persons age 15-64) in Klaipėda and Telsiai counties and Lithuania, 2014-2017

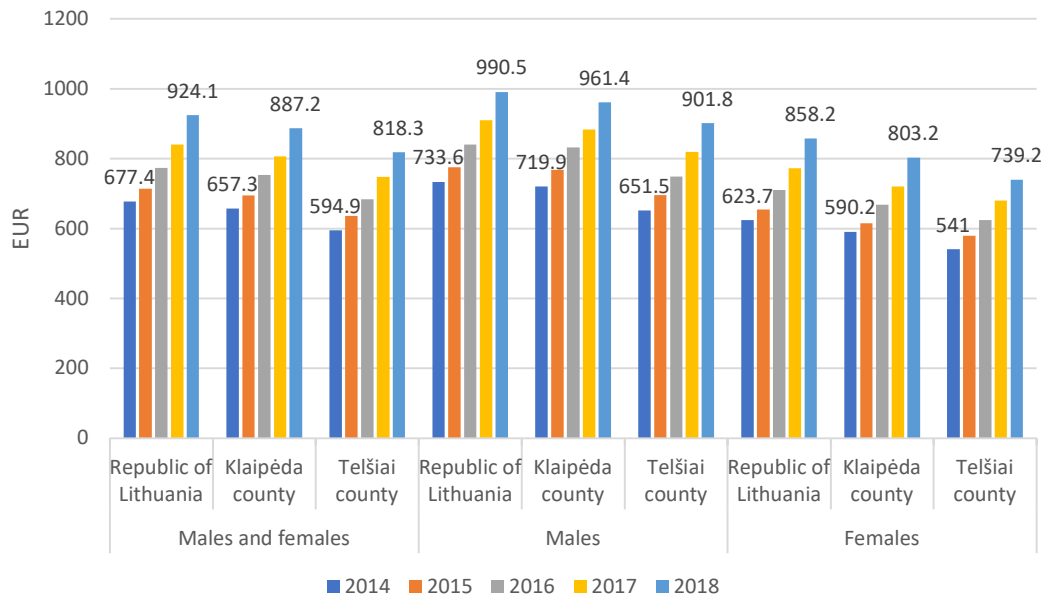
Ratio of the registered unemployed to the working-age population was slightly higher amongst females in Telsiai county during the period of 2014-2018 differing 2-3% from general national average (see figure 2.9).



Source: OSP Lithuania, 2019

Figure 2.9. Ratio of the unemployed to the working age population in Klaipėda and Telsiai counties and Lithuania, 2014-2018, %

As we can see in the survey results of the research area, salaries do not differ much when it comes to gender roles. However, national average is still remaining with a considerable gap (see figure 2.10).



Source: OSP Lithuania, 2019

Figure 2.10. Average gross earnings (monthly) in Klaipeda and Telsiai counties, 2014-2018, EUR

Salaries of national average are higher throughout the whole period of 2014-2018 than they are in the research area, especially in the case of Telsiai. As well as the salary for women in Telsiai 739,2 EUR in 2018 is much different from a male salary of 990,5 EUR on the national average.

Table 2.8. Number of employees of enterprises in operation at the beginning of the year in Klaipeda and Telsiai counties, 2015-2019, units

	2015	2016	2017	2018	2019	2019/2015, %
Klaipeda county, total	92 086	94 888	95 405	96 962	95 405	4%
0-4 employees	10 817	11 185	11 07	11 195	11 444	6%
5-9 employees	12 279	12 472	12 825	13 003	12 738	4%
10-49 employees	28 403	29 05	28 855	28 576	28 943	2%
50-249 employees	24 312	24 884	25 545	26 831	26 471	9%
>250 employees	16 275	17 297	17 11	17 357	15 809	-3%
Telsiai county, total	33 583	33 946	34 278	34 575	34 209	2%
0-4 employees	3 001	3 13	3 15	3 22	3 286	9%
5-9 employees	3 775	3 861	4 036	3 998	3 949	5%
10-49 employees	9 595	9 724	9 815	9 71	9 947	4%
50-249 employees	9 671	9 436	9 375	10 305	9 57	-1%
>250 employees	7 541	7 795	7 902	7 342	7 457	-1%

Source: OSP Lithuania, 2019

Both in Klaipeda and Telsiai county the total number of employees have increased since 2015 (+4% and +2% respectively). In both counties, about one third of the total workforce is employed in small (10-49 employees) and medium-size companies (50-249 employees). The importance of micro-enterprises (0-9 employees) in employment is also significant, accounting for approximately 1/4 of total employment. The number of employees has risen in micro and small enterprises since 2015, but decreased in large (>250 employees) company group (see table 2.8).

Main economic activity in Klaipeda county with the largest number of economically active enterprises is Wholesale and retail trade; repair of motor vehicles and motorcycle (23% of the total number of enterprises), followed by Construction (12%) and Arts, entertainment and recreation (12%) in 2017 (see table 2.9). Telsiai county has similar structure of economic activity: Wholesale and retail trade; repair of motor vehicles and motorcycle (28%), Construction (16%) and Arts, entertainment and recreation (12%) in 2017.

Table 2.9. Number of local units by place of activity in non-financial enterprises (2015-2017)

	Klaipeda county			Telsiai county		
	2015	2017	2017/2015	2015	2017	2017/2015
Forestry and fishing	266	301	13%	220	244	11%
Mining, quarrying and manufacturing	2 565	2 661	4%	961	943	-2%
Electricity, gas, water supply and waste management activities	222	217	-2%	159	160	1%
Construction	3 447	3 802	10%	1 447	1 592	10%
Wholesale and retail trade; repair of motor vehicles and motorcycle	7 308	7 043	-4%	2 875	2 731	-5%
Transportation and storage	1 873	2 106	12%	454	563	24%
Accommodation and food service activities	1 187	1 868	57%	202	230	14%
Information and communication	432	566	31%	131	143	9%
Real estate activities	2 417	2 677	11%	296	384	30%
Professional, scientific and technical activities	2 722	3 075	13%	637	685	8%
Administrative and support service activities	954	1 215	27%	226	310	37%
Education, health and social work and other social service activities	1 366	1 714	25%	435	570	31%
Arts, entertainment and recreation	3 201	3 841	20%	999	1 202	20%

Source: OSP Lithuania, 2019

The economic activity in lamprey related industries (see table 2.9 - grey) has increased in 2017 compared to 2015 both in Klaipeda and Telsiai counties.

In terms of number of persons employed by place of activity in non-financial enterprises (see table 2.10), leading industries in Telsiai county are: Accommodation and food service activities (32%), Forestry and fishing (29%), Real estate activities (27%) and Information and communication (11%). Klaipeda: Mining, quarrying and manufacturing (21%), Wholesale and retail trade; repair of motor vehicles and motorcycle (20%), Wholesale and retail trade; repair of motor vehicles and motorcycle (20%), Construction (11%). Overall in Lithuania more persons are employed in Mining, quarrying and manufacturing (30%), Transportation and storage (17%), Construction (15%).

Table 2.10. Number of persons employed by place of activity in non-financial enterprises in Klaipėda and Telsiai counties, 2017, pers

	Klaipėda county			Telsiai county		
	2015	2017	2017/2015	2015	2017	2017/2015
Forestry and fishing	1 408	1 439	2%	931	873	-6%
Mining, quarrying and manufacturing	25 797	26 948	4%	10 764	10 927	2%
Electricity, gas, water supply and waste management activities	3 123	3 209	3%	1 432	1 526	7%
Construction	13 199	14 189	8%	6 299	6 397	2%
Wholesale and retail trade; repair of motor vehicles and motorcycle	25 807	24 954	-3%	9 613	9 626	0%
Transportation and storage	18 000	19 687	9%	3 545	3 846	8%
Accommodation and food service activities	6 300	7 055	12%	984	973	-1%
Information and communication	1 330	1 493	12%	331	344	4%
Real estate activities	2 983	3 571	20%	727	831	14%
Professional, scientific and technical activities	5 552	6 073	9%	1 173	1 228	5%
Administrative and support service activities	8 567	7 381	-14%	1 626	1 552	-5%
Education, health and social work and other social service activities	3 766	4 626	23%	1 338	1 533	15%
Arts, entertainment and recreation	3 562	4 337	22%	1 104	1 223	11%

Source: OSP Lithuania, 2019

The number of persons employed in lamprey-related industries has increase in Klaipėda county in 2017 compared to 2015, while in Telsiai county the number of employed persons in Forestry and fishing and also in industry of Accommodation and food service activities has decreased in 2017 versus 2015.

2.5. Fishing and fish processing in Klaipėda and Telsiai counties

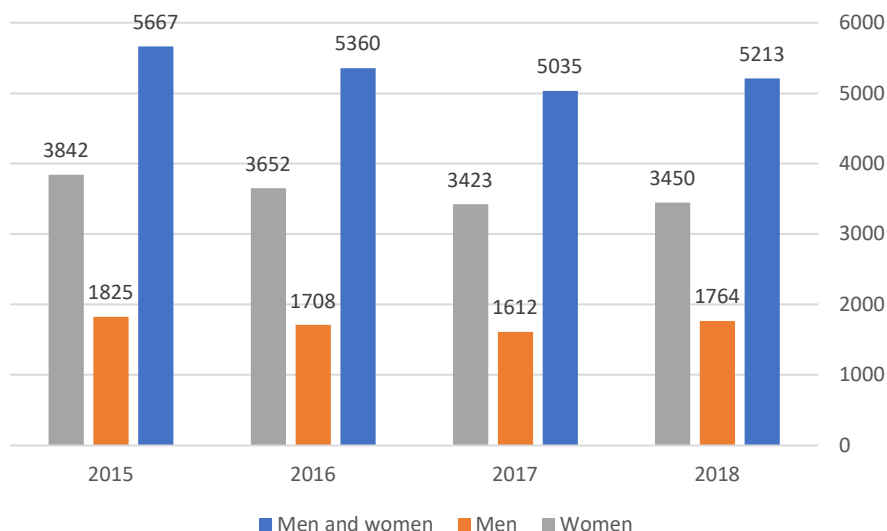
Fisheries have a long tradition and play an important role in small communities in coastal areas of Lithuania. The sector employs 6 037 full-time workers: 565 in fisheries, 431 in aquaculture, and 5 041 in fish processing. About two-thirds of the employees are women who are traditionally employed in the fish processing industry⁶.

The Lithuanian fleet for fishing in the Baltic Sea is divided into 2 segments: small-scale operating in the Baltic Sea coastal area and large-scale operating in the Baltic Sea offshore. The Baltic Sea marine fishery that also includes the coastal fishery captured 24 748 tonnes of fish. The four main commercial species are cod, herring, sprat and plaice. Inland fisheries account for a little under 2% of Lithuania's total catches. 1 090 tonnes were captured in 2017 with the Curonian Lagoon being the most significant inland fishing area. The most targeted species include bream, roach, pike perch and vimba⁶.

Lithuanian processing sector is important due to its economic size and employment rate. In 2018, there were 95 fish processing companies distributed across almost all the regions of the country – 12% more

⁶ EUROFISH, 2019, available at: <https://www.eurofish.dk/lithuania>

companies than in 2017. Fish processing companies in 2017 employed more than 5 041 employees all together, and in 2018, according to the preliminary results, the number of employees increased by 3%, to approximately 5 200 employees (see the figure 2.11)⁶.



Source: OSP Lithuania, 2019

Figure 2.11. Average number of employees in the fish processing industry / persons

Preliminary data indicates that total production of processed fish reached 126 000 tonnes in 2018, increase of 3% compared to 2017. Production (122 000 tonnes) in 2017 was a 1% increase in 2016. The value of production in 2018 was almost €696 million, 13% more than in 2017, which was a substantial increase compared to the previous period: the value of production in 2017 peaked at €617 million, 3% more than in 2016⁶.

The structure of main species used for processing in 2017-2018 period was steady: salmon, which accounted for 36.5% of all produced fish in 2017 and 33.6% in 2018; herring, 12% of all produced fish in 2017 and 11.7% in 2018; cod, 8.6% of all produced fish in 2017 and 7.1% in 2018. The largest share of all processed products both in 2017 and 2018 were surimi products, which accounted for 30% of all processed fish products in 2017 and almost 34% in 2018. 32% of all processed fish in 2017 were smoked fish (including fillets) and 14% were prepared as frozen fish fillets. Whereas in 2018, smoked fish (including fillets) accounted for almost 29% of all processed fish products, and 18% were prepared as frozen fish fillets⁶.

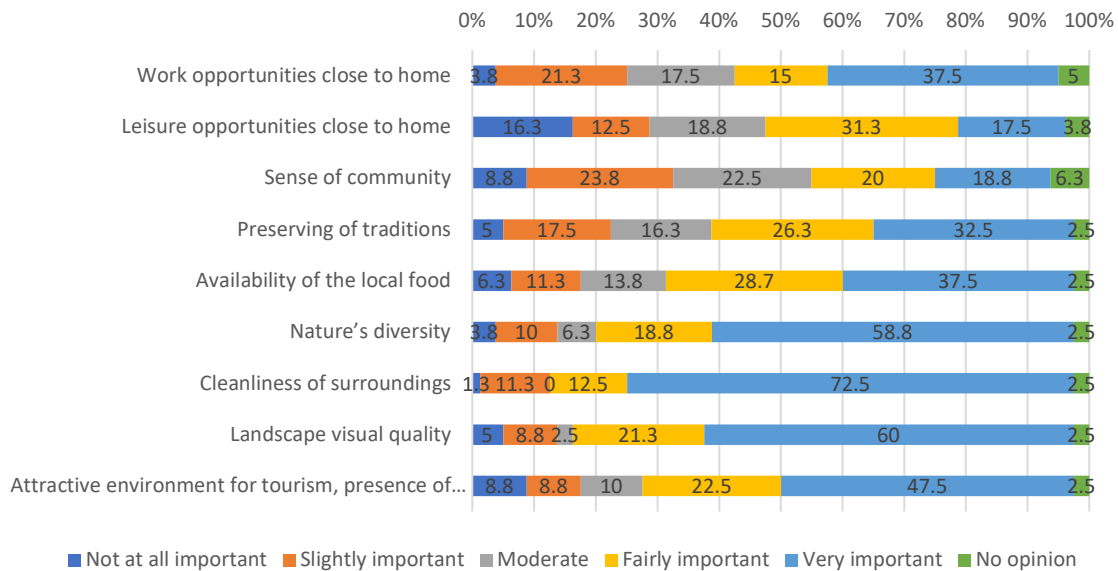
Most of the material used by fish processing companies for processed fish products (95% in 2017, 96% in 2018) were imported, which in both 2017 and 2018 accounted for 72% of all imported fish and fish products into Lithuania. The remaining 28% were for reexport or for end-user consumption. However, on average only 36% of products processed in Lithuanian fish processing companies are exported abroad: 30% to EU countries and 6 % to non-EU countries. 64% of processed fish products were for consumption in Lithuania⁶.

The main export market of fish and fish products from Lithuania both in 2017 and 2018 were in the EU with Germany, Denmark, Latvia and Italy as the most important destinations⁶.

The key challenge for the fishing sector is to develop environmentally sustainable and profitable fisheries by enhancing the competitiveness of fisheries businesses and reducing the impact of fishing on the marine environment. The main challenge in the processing industry is improving market organisation, and increasing profitability to make the entire supply chain more sustainable, and reducing dependency on imported raw materials⁶.

2.6. Local opinion on factors of life quality in Klaipeda and Telsiai counties

The analysis of trends of social and economic development gives an insight into the external conditions for the living in Klaipeda and Telsiai counties, but for the purpose of this study it was important to characterize also the local residents' opinion (private attitude) of the factors of quality of life that are important for them, to find out the possible relationship among those factors and lamprey stock being in the region. The results of residents' survey were used to evaluate the local public opinion on the factors of quality of life in Project areas in Latvia and Lithuania. The respondents could express their attitude on defined factors of quality of life, by answering the question *"how important to your welfare and life quality are following aspects of your life"*. According to the results from Lithuania's survey (see figure 2.12) the most important factors of life quality are related to the nature values in surrounding.



Source: authors' calculation based on the residents' survey results, 2019

Figure 2.12. Local residents' opinion on the factors of life quality in Klaipeda and Telsiai counties

When evaluating aspects important to welfare and life quality, residents consider cleanliness of surroundings (72,5%) as the most important criteria. Landscape visual quality (60%), nature's diversity (58,8%), attractive environment for tourism, presence of tourism spots (47,5%), follow respectively.

2.7. Conclusions

After the collapse of the Soviet Union, the population of all the Baltic States changed dramatically. In the past twenty-five years (since the beginning of 1993), the population declined in each country. In Latvia and Lithuania, population decreased the most – respectively by 25.7% and 24.4% (OPS, 2020). Besides, the migration rate is decreasing in Lithuania, it shows the possibility that people would stay in Lithuania and there will not be big changes in the population upcoming years. Also, the salaries are increasing which contributes to the people well-being.

There is growing number of persons in the most of economic activities sectors of the study region, for instance, in Individual merchants; commercial companies (micro, small, medium and large). Unfortunately, in the forestry and fisheries economic activity the number of performers decreased by 12,68% in Lithuania. On the other hand, the fish consumption is growing in Lithuania and from 2014 the consumption from 17 kg went up to 23 kg. Moreover, the average number of employees in the fish processing industry and the income from the sale of fish products or provision of manufacture of fish products-related services are growing. There is a need for the fish resources.

3. Lamprey stock and usage in the region

Chapter contains the results of the analyses of social, economic and environmental values generated by the lamprey stock and fishery in different value-creating stages, beginning with the stock and ending with the consumption of the lamprey products. The approach of value chain is used for the structure of the chapter and presentation of the assessment results.

3.1. Economic aspects of lamprey use

River lamprey is a specially protected species of European interest. It is listed on the International Union for Conservation of Nature (IUCN) Red list of Threatened Species and on Annex III of the Bern Convention and Annex I and V of Council Directive 92/43 / EEC on the conservation of natural habitats of wild fauna and flora.

It has the status of a restricted use specially protected species in Latvia and Lithuania. This means that river lamprey can be fished for commercial purposes as long as the exploitation does not endanger the specie's ability to recover. In the past, the fishing and consumption area of the river lamprey was wide in Europe, but as a result of the effects of various anthropogenic factors, the capacity of lamprey to recover has decreased significantly. At the present, in the Baltic Sea region, river lamprey is still fished in Latvia, Lithuania, Estonia, Sweden and Finland.

Lamprey fishing in Kurzeme region

Lamprey fishery in Latvia is strictly regulated by determining the location of the fishing grounds, the gear limit at each fishing ground, the length of the closed season at each river, and the basic principles of the design and the use of fishing gear are prescribed by legislation.

The limit of 97 fyke-nets in Kurzeme region and total allowed amount of gears has not changed since 2015, except some minor changes like number of fishing gears set jointly in one row or position of row to coast. Currently, river lamprey fishing in Kurzeme region is carried out at 15 fishing grounds on 9 rivers. The length of the closed season of the Irbe, Venta, Užava, Saka rivers is from 01 February till 31 July, but the Grīva, Roja, Pilsupe, Melnsilupe and Rīva rivers – from 01 February till 31 October.

Local municipalities allocate the usage of lamprey fishing gears between fishermen, the rental rights are granted for 10 - 15 years period, but they may be terminated, if the tenant breaches the lamprey fishing regulations.

Most of the lamprey fishing grounds (except the Venta River) are on the lowest parts of rivers less than 5 km from the sea (one fishing ground per river). On the Venta River seven lamprey fishing grounds are located from 11 km to 85 km from the sea. From licenced 97 lamprey fishing gears, 56 are operated on the Venta River, 16 – the Saka river, 14 – the Irbe river thus indicating most important lamprey rivers of Kurzeme region.

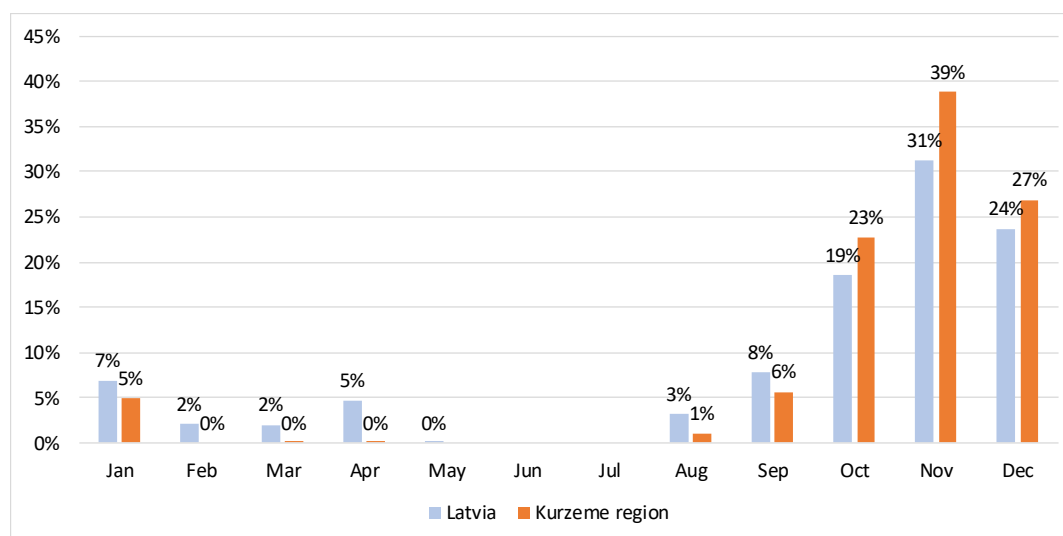
During the study information about 32 registered lamprey fishers operating on the rivers of the Kurzeme region in 2018 were acquired. In 2019, one lamprey fishing company dissolved, continuing declining trend in the number of lamprey fishers. In 2011, there were 48 lamprey fishing companies, then due to the consolidation of companies operating in the Venta river (2015 – 2016) total number decreased till 34 in 2016. Number of lamprey fishermen is stable for other rivers of the Kurzeme region.

Taking into account that the number of fishing gears is fixed for many years, fishing licences are auctioned for up to 15 years period and the same market players operate for long-term (the average age of companies fishing lamprey on the rivers of the Kurzemes region - 18 years). Thus, the entry options to raw material market seem to be restricted.

Legal form of 21 company (out of 31) are sole traders, private unlimited companies (agriculture/fishermen farms) or non-profit organisations. No financial and employment data are

available for most of these companies. Combining the available data with the information gained from the interviews and certain assumptions based on the legal form of lamprey fisherman, it is concluded that about 53 - 63 people could be directly involved in licenced lamprey fishing in Kurzeme region. Some of fishermen merged in non-profit organisation used as a tool for creating equal catch conditions on one river, for example NGO "Piejūras novadu zvejnieku biedrība" associates three companies (SIA "Kaija", SIA "Aisbergs JV" and SIA "Lagūna L"), all fishing lamprey in the Saka river.

The lampreys are fished when they return from the sea to the river for a spawning. The flow of lamprey into the river is determined by many different natural factors beyond human control. Fishermen can only to observe relations year after year and thus to guess (predict) fishing intensity. Seasonality of 8-year average catches indicates that fishing intensity peaks in November - December both in Latvia on average and in Kurzeme region (see figure 3.1). According to the interviews, fishermen have observed that in the past the flow of lamprey begun to increase more rapidly in August (in rivers where fishing is permitted in August), but in recent years, probably due to the climate change, the noticeable flow of lamprey into the rivers begins only in September - October.

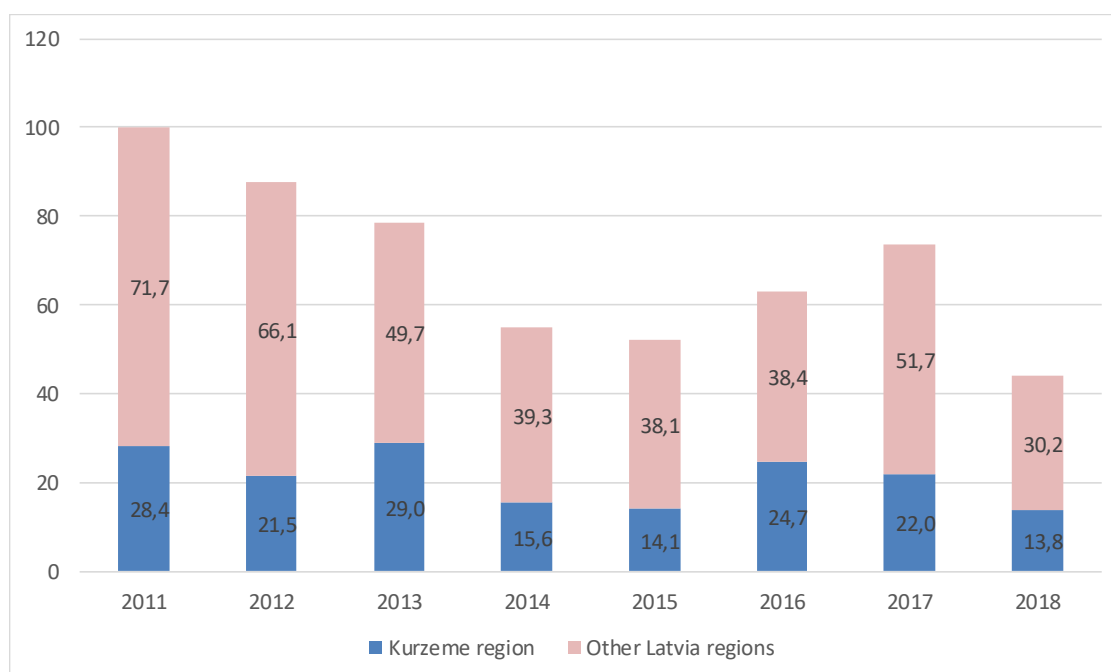


Source: BIOR

Figure 3.1. Lamprey catch seasonality for the rivers of Kurzeme region and Latvia (8-year average of 2011 – 2018)

Mean catch of 2011 – 2018 was 21.1 tonnes in Kurzeme region's rivers or 31% of total Latvia mean catch in the 8-year period. The catches fluctuated from 14.1 t per year (2014) to 29 t per year (2013) in this period (see figure 3.2). Considering that the population of Kurzeme region is 13% of total Latvian population, disproportion of catch share and the population share indicates that Kurzeme region's community economic benefits of lamprey stock use in local rivers noticeably exceed country average.

Main lamprey catch rivers of Kurzeme region are the Venta river – 42% share of 8-year total, the Saka river (31%) and the Irbe river (10%). Average 8-year catch in the Venta river is 8.9 t per year, fluctuating from 1.2 t (2018) to 14.0 t (2011). Average 8-year catch in the Saka river is 6.6 t per year, fluctuating from 4.5 t (2017) to 11.2 t (2013). Average 8-year catch in the Irbe river is 2.2 t per year, fluctuating from 0.7 t (2014) to 3.5 t (2016). It should be noted that the years of minimum and maximum catches differs among the rivers.



Source: authors' calculation based on data from BIOR

Figure 3.2. Dynamic of river lamprey catches on the rivers of Kurzeme and other Latvia rivers 2011 – 2018, t

Data on live/fresh lamprey prices are limited as there is no regular price monitoring for the product. BIOR tender results can serve as a source for 2016 – 2019. For other years, monitoring of mass media news were used and information gained during the interviews (see table 3.1.).

Table 3.1. Market prices of live/fresh lamprey 2011 – 2019

	2013	2014	2015	2016	2017	2018	2019
BIOR procurement (EUR/kg)				10.0	9.2		8.8
Mass media, interviews	5.4	8.5	14.0		7.5	8-10	8-10

Source: BIOR, various sources - press, news websites, interviews

According to the 3.1. table and also to the interviews, the price of live/fresh lamprey has risen during the last five years. The price fluctuates regarding the amount available in the market, demand from the processors, location, seller and seasonality, and it can differ from day to day during the fishing season. Fishermen sells lamprey live/fresh because the product can lose quality and taste properties, if it is frozen. There are two catching grounds (the Saka river and the Venta river in Kuldiga municipality) in Kurzeme region, where lamprey fishermen have a possibility to accumulate caught lamprey and wait for a better price. Lamprey fishermen are reluctant to share the information on the profitability of lamprey fishing but indicate that they are satisfied if the price of live/fresh lamprey exceeds 8 €/kg.

Considering lamprey eating traditions in Latvia and the high value, illegal, unregulated and unreported (IUU) lamprey fishing should be assessed. Estimation of the level of IUU fishing is notoriously difficult as even statistical parameters can be treated as uncertain. IUU Fishing may have negative impact on

the biological stock and this may lead to lower employment and less opportunities for new generations of fishers to participate in fishing⁷.

Table 3.2. Seized illegal fishing gears, including lamprey fyke-nets in Latvia

	2015	2016	2017	2018	2019/7M
Seized illegal fishing gears in inland waters	5 744	6 814	4 308	3 596	3 097
lamprey fyke-nets	269	3 256	145	92	78
lamprey fyke-nets, %	4,7%	47,8%	3,4%	2,6%	2,5%

Source: SES, 2019

Statistics of SES demonstrates long-term steadily decrease of seized illegal fishing gears in inland waters (-67% 2018/2008), however number of seized fishing gears in 7 months of 2019 is by 27% more than in 7 months of 2018 (see table 3.2). At the same time the change of tactics from inspections quantity to quality⁸, by using more efficient control tools was announced by SES.

Statistics on the number of seized lampreys fyke-nets show similar long-term decreasing trend, except 2016. In 2018, total amount of seized lamprey fyke-nets (78) makes about 15% of the allowed number of lamprey fishing gears – remarkable proportion of IUU fishing allowing to conclude that high economic incentives or social drivers to engage in IUU lamprey activities exist.

Extremely high amount of lamprey fyke-nets were seized in 2016 (nearly half of total illegal fishing gears seized in inland waters) - SES seized 2970 illegal lamprey fyke-nets owned by one legitimate lamprey fishing cooperative (allowed 126 fyke-nets) per one inspection. In 2016, total amount of seized illegal lamprey fyke-nets was more than 5 times the total amount of licenced lamprey fishing gears. IUU lamprey catch with extreme in 2016 allows to presume the existence of higher market capacity for lamprey products, which in its turn indicates on the economic importance of lamprey stock, however potentially high amount of IUU lamprey products which has access to markets increases market data uncertainty.

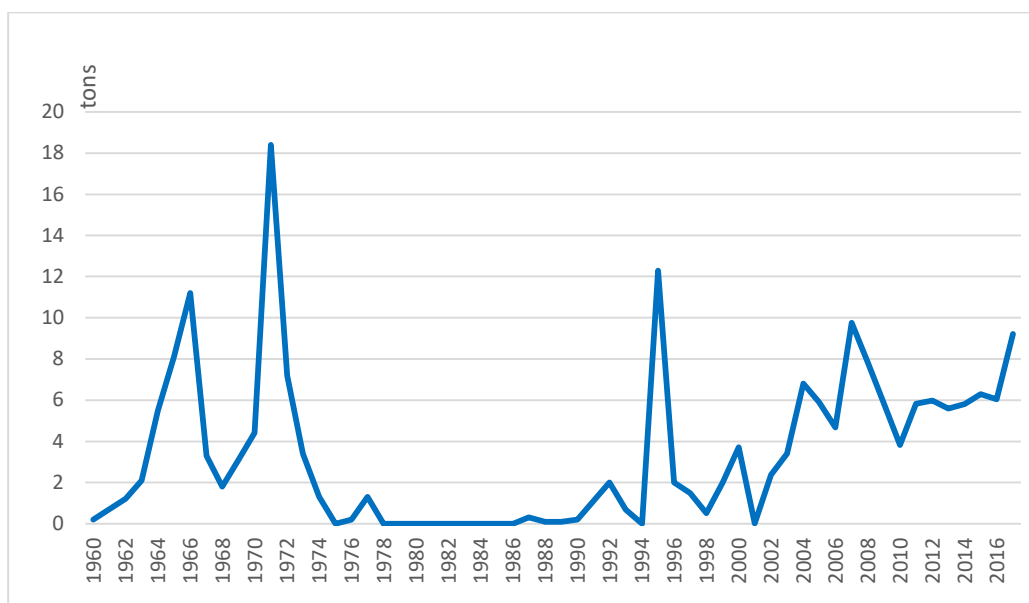
According to the interviews, one of the most popular illegal lampreys catch place in Kurzeme region used to be the Venta Hub, in Kuldīga. There have been years, when 30 – 150 illegal lamprey gears were seized from there (none in this season). In other rivers also some amount of illegal fishing exists, because of wide sparsely populated areas around the rivers, but based on the assessment of environmental inspectors, illegal fishing has decreased during the last years in Kurzeme region: environmental inspectors have good collaboration with anglers, who inform if illegal activities are observed, and also legal lamprey fishermen look after their rivers, making the control process more effective.

Lamprey fishing in Klaipėda and Telsiai counties

River lampreys in the Curonian Lagoon and the Nemunas Delta are classified as less important commercial fish. Their greatest catches were to be found in the 19th century, where, according to Benecke (1881), in the Nemunas Delta alone, the Skirvytė branch caught about 240 thousand lampreys. During the interwar period, their catches were also ten times higher than now. Maniukas J. (1959) points, that during the interwar period and 1940s, catches of crayfish varied between 30.1-52.7 tons.

⁷ Messrs et.al. 2004

⁸ Valsts vides dienesta 2018. gada publiskais pārskats, 11.lpp.



Source: the data provided by project partner (collected from various resources)

Figure 3.3. Dynamics of lamprey catches in Lithuania, tons

In the second half of the 20th century, catches of lamprey fish in statistics increased only in the 1990s. In 1995, the maximum catch reached 12.3 t. Meanwhile, in 1994 and 1996, there is no data about lamprey catches and it was not related to the natural fluctuations in resources. The real statistics of lamprey catches in the Soviet times are also unknown, due to that lamprey was valued as delicacy fish, therefore the sales of it were often hidden. Also, the frozen lampreys lose their nutritional properties and they were not good for sale.

Although a trend towards recovery has recently been observed for the stocks of lamprey in several European waters, it is expected that the actual status of the populations of these species in Europe is still far from the historical situation (Thiel et al. 2009).

In Lithuania, river lamprey is commercially fished in the Sventoji River, Curonian lagoon and the Nemunas River Delta (see the table 3.3). Curonian Lagoon is the main fishing ground. Since 2010 catches here correspond to 65% (ranging from 42,2% to 90,5%).

Table 3.3. Dynamics of lamprey catches in Klaipeda and Telsai counties, kg

	Sventoji river, kg	Nemunas river, kg	Curonian Lagoon, kg
2010	3815	N/A*	N/A*
2011	2284	2807	3084
2012	1378	1948	5406
2013	1747	2260	3329
2014	929	N/A*	1161
2015	377	6,1	3101
2016	563	75	6045
2017	1253	91	7864
2018	1251	N/A*	6088

Source: fishermen logbooks, project partner, Silute Nature Conservation Inspectorate

* data is requested from Silute Nature Conservation Inspectorate

As the fishing grounds in Nemunas and Sventoji river are situated in close to the river mouths, catches there are greatly affected by hydrological conditions during the fishing period and the catches fluctuate by year. There have also been attempts to fish in upper sections of the Nemunas River just below constructed Kaunas Hydroelectric Power Plant. However, this fishing ground was used only in 1966.

River lamprey catch limit in Lithuania is set by the Ministry of Environment. For a fishing period of 4 years there are organized auctions for Individual Transferable Quotas in the Sventoji River for 1,5 t and the Nemunas River Delta for 2 t. In the Sventoji river, fyke nets are used to catch lampreys and in the Nemunas river, it is only allowed to fish with lamprey cone traps. Lamprey fishery in Curonian Lagoon is regulated by setting gear limit. In the Lithuanian part of the Curonian Lagoon, it is allowed to use 32 lamprey fyke nets with 5-10 mm mesh size limit for a hoop net. Additionally, it is considered possibility to introduce 20 specialised ruffe-stickleback fyke nets that would also target lampreys. There is also set a closure period for the lamprey fishery from January 1 to September 15 in all fishing grounds.

The number of enterprises engaged in lamprey fishing is increasing lately (see table 3.4).

Table 3.4. Dynamics of fishing enterprises engaged in lamprey fishery in Klaipeda and Telsai counties

	Sventoji river	Nemunas river	Curonian Lagoon	Total	Employment by fishing enterprises (range)	
2010	7	1	6	13	27	35
2011	5	1	8	13	28	37
2012	5	1	7	12	27	36
2013	5	1	6	11	24	32
2014*						
2015	4	2	11	16	31	40
2016	4	1	11	15	50	62
2017*						
2018*						

Source: fishermen logbooks, project partners, Silute Nature Conservation Inspectorate

** data is requested from Silute Nature Conservation Inspectorate*

During the study the interviews were carried out with 9 fishermen in Lithuania. 4 out of 9 are fishing in Sventoji river, 3 in Curonian Lagoon and 1 in Nemunas. 3 out of 9 fishermen replied that their main fishing target is lamprey. Besides the lamprey fishing they are fishing cod, smelt, herring, salmon and all the fish can be caught in the Baltic Sea. Also, bream, roach, pike perch and vimba were mentioned by fishermen who are fishing in Curonian Lagoon.

6 out of 9 fishermen considered lamprey as a resource and lamprey fishing as an important economic activity for the development of the region. 3 out of 4 fishermen which are fishing in Sventoji river expressed different opinion. According to them, lamprey is not very important economic activity for development of the region, because the catches of lamprey are too small. Also, as limiting factor was mentioned, that lamprey fishing traditions in Lithuania is close to become extinct.

According to the interviews, the main motivation to continue lamprey fishing are incomes and educational activities on lamprey fishing. One of the interviewees noted, that his company offers the educational activities on lamprey fishing. Also, the transfer of work experience and knowledge (fishing skills) is based on educational programs. The fishermen fishing experience varies from 3 to above 25 years which showed the continuation of family fishing traditions.

The set of assets (equipment) were indicated which is needed for lamprey fishing. For instance, boat, motor, ropes, shotguns, buoys, anchors etc. and the place for storing the necessary equipment. Every 5 years around 5000-8000 EUR is needed for fishing equipment renewal.

The main variable costs of lamprey fishing are labour costs, fuel costs, the costs for fishing gears and the maintenance of fishing gears. 8 out of 9 noted that variable costs are labour costs. 7 out of 9 marked that fuel costs are variable.

The fisherman, who is fishing in Nemunas river mentioned, that lamprey catches is falling due to nature conditions like river shallows, currents in the Curonian Lagoon, low water level. While fishermen from Curonian Lagoon didn't agree, that lamprey catches are falling. Moreover, one of them noted, that he sees it opposite – the lamprey catches are increasing. Also, on the opinion of Sventoji river fishermen the lamprey catches are not decreasing. Another fisherman pointed out that the amount of catches is depending on the weather conditions or it depends on illegal and not reported fishing.

The most of the catch from Sventoji River is exported to Latvia, similarly the majority of the catches from Curonian Lagoon and Nemunas delta are sold to Latvian buyers. And just a small part of the lamprey is sold to the local producers (smoke houses) or local consumers. The fishermen are selling fish in various conditions but the main is fresh, also part of it frozen. 3 out of 9 fishermen indicated that they are exporting the lamprey to Latvia. The prices differ from 2-10 EUR/kg depending on fishing area. As main factors influencing the price were indicated the catch amount of fish and the situation with lamprey catches in Latvia.

Processing lamprey products in Latvia

Most popular lamprey products in Latvia are smoked, grilled, fried lamprey, but they can be added to soups, pies, mixed food (salads, sushi) also. All lamprey products are hand work. According to the residents' survey the most popular product is fried lamprey (82.7% of respondents). Latvian traditional recipe⁹ of preparing fried lamprey is 4 – 5 minutes frying of both sides of lamprey on alder charcoal, then putting fried lamprey in bowl, pouring with boiling water, adding salt then stewing until they are prepared. Boiling water with lamprey fat jellies (bullion) is used for pouring the prepared lamprey (sometimes tea or coffee is used for jelly colouring). Ready product is packed in wooden tubs then pressed.

The most traditional lamprey product in Kurzeme region (from the past) is smoked lamprey, and there are some small-scale home processors still offering smoked lamprey, but just as a part of tourism service, because of the product price. The raw (live/fresh) lamprey is already an expensive product, but in the process of smoking lamprey loses almost a half of its weight, so the price for prepared smoked lamprey should be at least 2.5 - 3 times the raw material cost – and that is a producer's, not retail price.

To assess the production of lamprey products, companies which have been announced or declared lamprey processing as their core business activity were chosen. Selection was not limited to Kurzeme region, as there could exist sales of raw material (live, fresh lamprey) to processing companies outside of Kurzeme region.

Obtained data on 8 Latvia lamprey producers were analysed. Small scale home processors (individual merchants) were not included in the analysis because of the lack of publicly available financial data. There is no statistics to measure lamprey processing industry and total share of 8 selected producers, however, it is assumed that their aggregated share is significant enough to reflect the status of the industry. The largest lamprey processing companies are located near Riga (Pierīga region) or in Riga. 5 of them are located in Carnikava municipality, one in Salacgrīva municipality, one in Engure

⁹ Pētersone, 2015

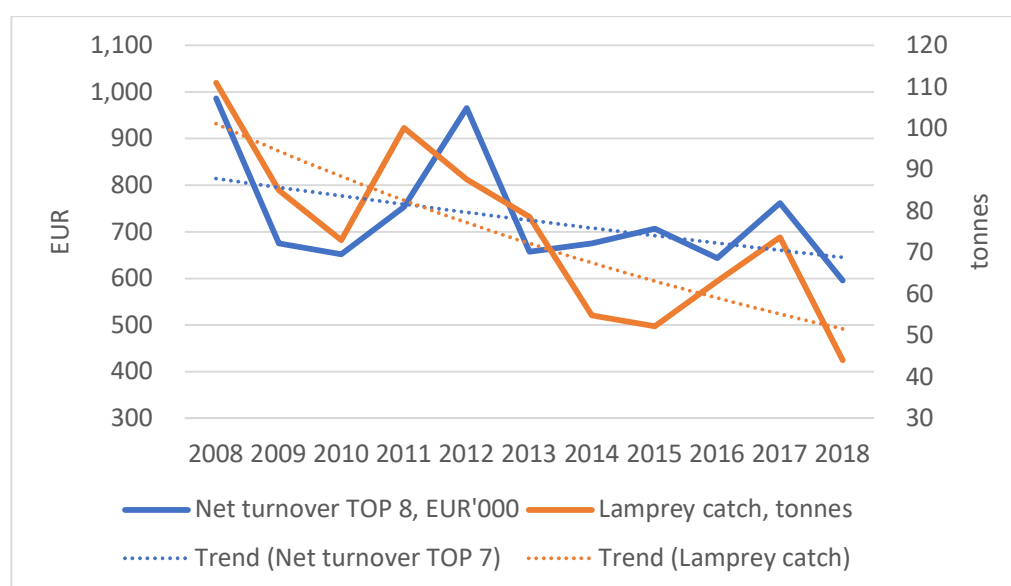
municipality which borders Kurzeme region (Roja municipality) and one in Riga. Only home processors are located directly in Kurzeme region with relatively small scale of production amount.

One lamprey processing company located in Carnikava municipality dissolved in 2017 (no financials available for 2017 – 2018). We assume that this doesn't significantly affect the conclusions about lamprey processing industry given the fact that the share of the producer was marginal (5% of TOP-8 in 2016). Lamprey catch decline probably intensifies struggle for lamprey resources and several other local producers were available thus not implying a serious change in the production flow.

Aggregated net turnover fluctuated from EUR 895 thous. in 2008, being the 10-year peak, to EUR 595 thous. in 2018, being the lowest point.

Correlation between the lamprey catch and TOP-8 lamprey producers' aggregated net turnover can be measured as significant (0.79) allowing to conclude that moderate to significant dependence of main lamprey producers from declared lamprey catch exist, which in turn means that the role of import or IUU fishing in declared processed lamprey production could not be significant (see figure 3.4).

Downturn of 10-year lamprey catch is sharper than the decline of aggregated net turnover allowing to presume that catch fall had been compensated by other income or by higher lamprey product price.



Source: BIOR, www.firmas.lv

Figure 3.4. Dynamic of lamprey catch and net turnover of TOP-8 Latvian lamprey processing companies 2008 - 2018

Carnikava municipality is the key Latvia lamprey production spot with market share on average 53% of total (ranged from 44% to 59%). Total catch share in the Gauja river (traditional lamprey catch area in Carnikava municipality) is on average 19% (11% to 31% during 2011 – 2018) and peaks of aggregated net turnover doesn't correlate with catch size or share in the Gauja river. This allow to conclude that Carnikava municipality's companies process significant volume of lamprey resources caught in other regions and highly probably gain from proximity to the higher income areas (the capital city Riga and surroundings).

According to the interviews with the fishermen, the lampreys caught in Kurzeme region rivers are mainly sold to the processing companies in Latvia; mostly SIA "Tilaudi" have been mentioned, but also AGALŪKS and companies from Carnikava municipality: SIA "Krupis", Gundegas IP, SIA "Kurzeme GB".

In turn, the processing companies have also mentioned that they prefer the Latvian origin lamprey, but, if there is not enough, the imported lamprey from Lithuania and Estonia may be used in processing the lamprey products.

Processing lamprey products in Lithuania

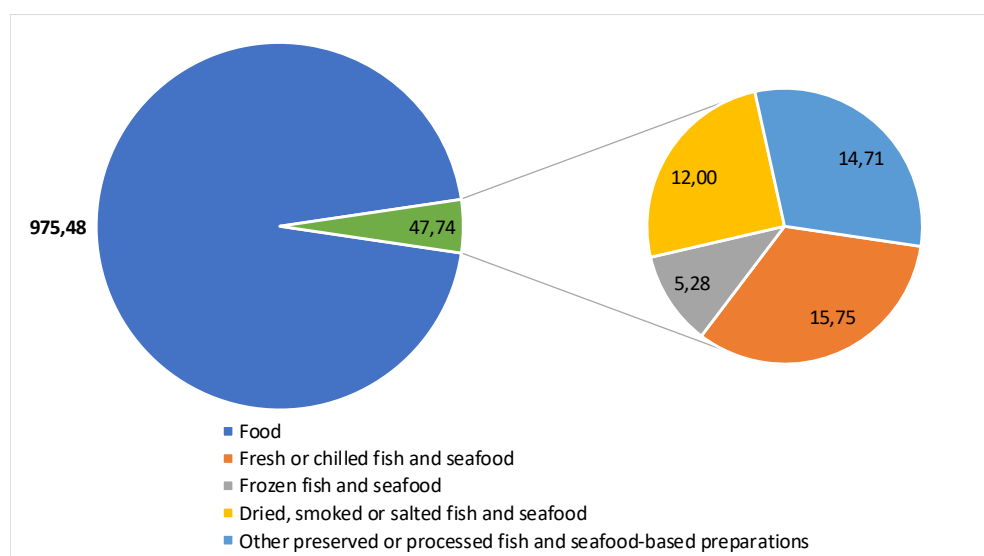
Four main Lithuanian lamprey processors (who are also traders) were interviewed during the study.

3 of 4 are still processing the lamprey, also offering educational activities as well as a small fish tasting events. One of the producers interviewed explained that their company does not offer the smoked lamprey products anymore already for 5 years. The one smoked lamprey fish cost 1 Eur and the weight is around 80 g. Approximately, 1 kg of production consist of 10-12 smoked lamprey fish and the profit was just 3 EUR from sold 1kg of production which was not enough. The company pointed out, that it would be worth to continue smoking lamprey, if they give profit 5-7 EUR/k (50-70% profit). In the past, the consumption and production of lamprey was much higher and the company was selling much more of the fish until the Latvian processors started to buy lamprey as a raw material from Lithuanian fishermen, and the prices went up. At the moment the majority of all Lithianan lamprey cathees are sold to Latvia. According to the interviews, the smoked lamprey fish should cost 1,5-2 EUR/ piece, to be worth to process it and smoke the fish, but that would be illogical price, too expensive for the consumer, because 1 Eur/ piece is already too expensive.

Other fish producer has 30 year experience in processing lamprey fish. The production of lamprey is seasonal during the fishing period. It is family business and 10 people are working in his company. The company is buying just fresh lamprey from local fishermen, which is legally caught. The prices various from 5 to 8 Eur/kg. During the past 3 years the prices increased from 3 to 8 EUR/kg which was a result of the Latvian buyers coming to Lithuanian market. The company is smoking only cleaned and ready to smoke lamprey. According to the interview, they process about 1 ton per year. The market price for smoked lamprey is 15 EUR/kg and the company sells it only for Lithuanian consumers. At the moment they do not see lamprey as potential resource for economic development of the Klaipeda and Telsiai counties.

Consumption of lamprey products in Kurzeme region and Latvia

Expenditure on food and non-alcoholic beverages of households is nearly the same -1 052 EUR in Kurzeme region and 1 047 EUR in Latvia (+0.4% in 2016). Fish and seafood share were only 5% of total food expenditure in 2016 (48 EUR out of 975 EUR in 2016). Lamprey products are included in subcategory of other preserved or processed fish and seafood-based preparations – together with traditional processed products like sprats in oil and totalling up less than 15 EUR on average per household member per year (see figure 3.5). Based on similarities in composition of household expenditure of food and non-alcoholic beverages we can assume that fish and seafood consumption expenditure doesn't differ significantly between Kurzeme and state average.



Source: CSB Latvia, 2019

Figure 3.5. Household consumption expenditure (ECOICOP) of food and fish and seafood in 2016, average per household member annually, EUR

In 2017/2016 mean disposable income per household member grew more rapidly than consumer prices (+8.8% vs. +5.7%) in Kurzeme, allowing to conclude that increased welfare highly probably had a positive impact on fish and seafood consumption. Kurzeme region's total household expenditure on fish and seafood is assessed to be 11.8 – 12.3 M EUR per year. Total household expenditure of canned fish is assessed to be 1.9 – 2.0 M EUR and processed fish products - 1.6 M EUR per year in Kurzeme region.

According to the survey, 93% of respondents have fish and other freshwater and seafood in their diet, and 89% of respondents have tried lamprey products at least once. About a half of respondents (45% in Kurzeme and 50% in Riga and Pieriga region) have lamprey products in their diet. More than a half of the respondents know lamprey as delicacy, 26% recognise it as *aquatic animal sometimes taken for human consumption* and only 10% of respondents think that lamprey products are unsavoury.

To create an data bases for analyses of consumption habits (amount and regularity), two questions were included in the survey's questionnaire: *how often do you eat lampreys?* and *please evaluate consumption of the lamprey products in your household: per one person per meal* (see table 3.5).

Table 3.5. Evaluation of lamprey product consumption habits in Latvia: Kurzeme, Pieriga Riga

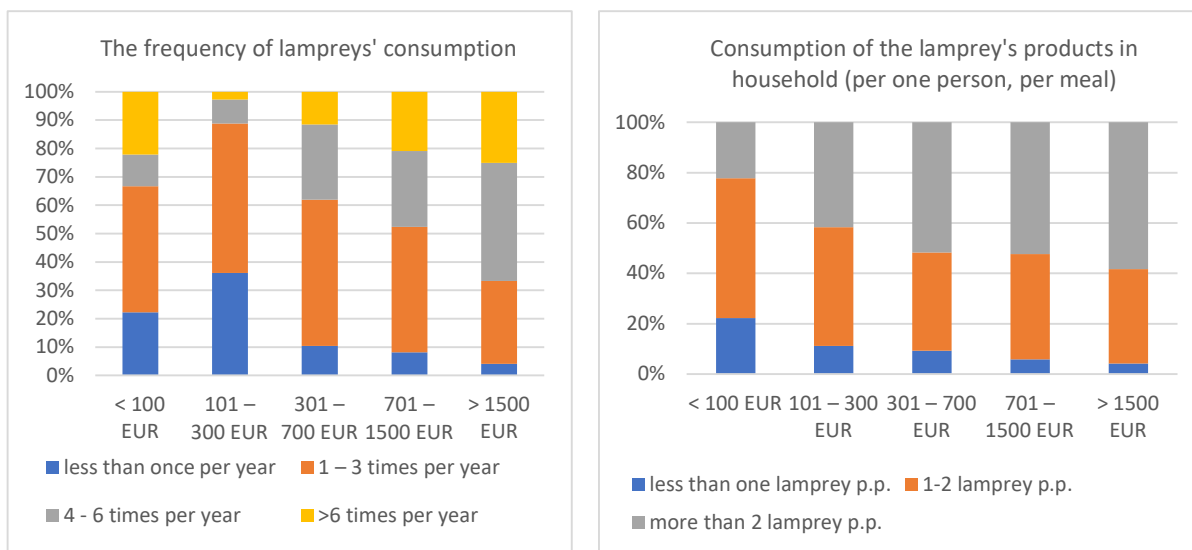
<i>Please evaluate consumption of the lamprey/lamprey products in your household: per one person per meal</i>	Kurzeme	Pieriga + Riga	Total
less than one lamprey per person	9.6%	7.1%	8.3%
1 – 2 lampreys per person	40.9%	42.5%	41.7%
more than two lampreys per person	49.6%	50.4%	50.0%
Total	100.0%	100.0%	100.0%
<i>How often do you eat lampreys?</i>			
less than once per year	21.7%	5.5%	13.2%
1 – 3 times per year	47.0%	46.5%	46.7%
4 – 6 times per year	19.1%	29.9%	24.8%
6+ times per year	12.2%	18.1%	15.3%
Total	100.0%	100.0%	100.0%

n=242 total, 115 Kurzeme; 127 Pieriga+Riga

Source: authors' calculation based on residents' survey, 2019

According to the residents' survey, little less than a half of respondents (47%) consume lamprey products 1 – 3 times per year. This result is also in line with the observations of the lamprey processors interviewed, the consumption of lamprey products is highest at Christmas, New Year's Eve, and November 18, which is Latvia's birthday. A half of respondents have evaluated that in their household one person per meal consumes more than 2 lampreys, another 40% of the survey participants evaluate their consumption as 1-2 piece of lamprey per person, per meal.

The status of lamprey as a delicacy naturally reveals also in the survey results. Analysing the consumption habits of lamprey, it can be observed that as the income level in the household increases, the frequency and volume of lamprey consumption also increases (see figure 3. 6).



n=511 total

Source: authors' calculation based on residents' survey, 2019

Figure 3.6. The structure of the lampreys' consumption by the incomes per person in a household

According to the survey results and based on the conservative assumptions, it is estimated¹⁰ that current market situation and consumption habits provide a market capacity up to 50 tons of lamprey (raw material) in Kurzeme region, and up to 300 tons of lamprey in the total surveyed area (Kurzeme, Riga, Pieriga region). In addition, according to the survey results, the demand for lamprey products is estimated to be inelastic (coefficient of demand elasticity of price is 0.6 average) in the survey area, which means that if the price of lamprey products increases by 1%, the demand is expected to decrease by 0.6%.

However, in the future there can be expected changes in the lamprey product consumption habits, because, according to the survey results, it seems to be a slight trend that lamprey products' consumption used to be wider in the past than it is now (see table 3.6). There are 14.7% of respondents declaring that they have no habit to consume lamprey products in their families, but just 4.7% of respondents admit that their parents or grandparents had no habit to consume lampreys.

¹⁰ Estimation is made for the illustration (appraise) of the situation, not for scientific use.

Table 3.6. Evaluation of lamprey eating traditions in the family

<i>Please evaluate lamprey eating traditions in your family</i>	Total
somebody in my family has lampreys in his/her diet	35.5%
somebody of my parents/grandparents has/had lampreys in his/her diet	39.0%
nobody in my family has lampreys in his/her diet	14.7%
nobody of my parents/grandparents has/had lampreys in his diet	4.7%
no opinion	6.1%
Total	100%

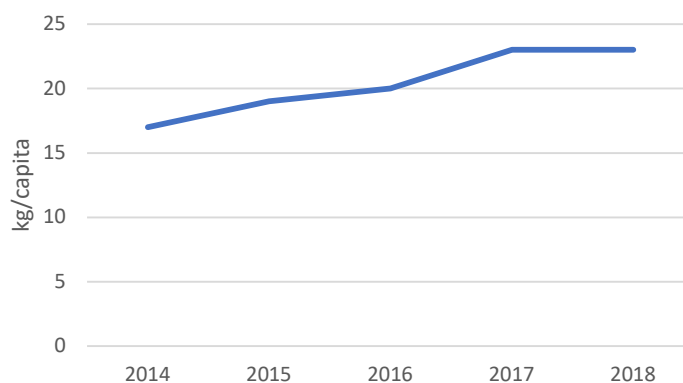
n= 511 total

Source: authors' calculation based on residents' survey, 2019

The information found in mass media for the previous years' allows to observe that the retail price for lamprey products has grown during last years. If it was possible to buy lamprey products in retail for 12EUR/kg in 2012, then in 2019/2020 season (retail price monitoring was implemented) the fried lamprey retail price didn't fall below 25 EUR/kg, fluctuating from 39EUR/kg at the beginning of the fishing season and in average 27EUR/kg at the peak of the consumption period (November – December). According to the residents' survey, about 1/5 of respondents buy lamprey live/fresh directly from the fishermen (then the price is lower: 6-10EUR/kg, in season 2019/2020 on average) another 1/5 of respondents replied that they purchased lamprey products directly from the processors (then the price was on average 16-23 EUR/kg in season 2019/2020).

Consumption of lamprey products in Klaipeda and Telsiai counties

In 2018, households of all EU countries spent more for buying fish and seafood than in 2017 (exception made for Sweden). Lithuania recorded an increase of 6,1% and ranked sixth in per capita household expenditure on fish and seafood in 2018 and % variation 2018/2017 (out-of-home consumption excluded) according to the Eurostat source of data. There is a tendency of growing fish and fish products' consumption recent years in Lithuania. The consumption from 17 kg/capita went up to 23kg/capita during last five years. (see figure 3.7).



Source: Agricultural Information and Rural Business Center

Figure 3.7. Dynamics of fish and fish products' consumption kg per capita in Lithuania

According to the residents' survey – lamprey products do not include in this tendency. Only 9% of respondents consume lamprey products at least once a year. 40% of respondents know lamprey as an aquatic animal sometimes taken for human consumption, 32,5 % consider lamprey to be a protected species and only 11% see it as a delicacy.

Also, when asked about lamprey eating traditions in a family, majority of the respondents showed no interest in having lamprey in their diet, although 92,5% household's diet includes of fish and other freshwater and seafood.

Main reason to exclude lampreys from the diet is of course limited availability of them in the market in Lithuanian case. Therefore, many respondents have never had a chance to taste it and even 90% of respondents chose to skip answering a question about lamprey consumption frequency. Also 17,5% of respondents find lampreys looking unappetizing and therefore excluding this fish from their diet.

It is also hard to give a retail price estimate of lampreys for the respondents, as well as hard to judge if the change in price would affect the market. 37,5% of the respondents believe that their habits would not be affected by a price drop of 25%, at the same time as 40% of them say that they would not buy it and 47,5% gave no answer at all.

Lamprey-related entertainment and/or culture events might be a suitable measure to introduce its low aware local market. Most of the respondents - 63,7% would be interested to participate in tasting/eating of lamprey food in a restaurant lamprey fishing. Visiting of lamprey-related tourism spots, culture events also seems appealing to them. However, it is still not the time for lamprey preparation masterclass, as 52,5% are not interested to participate.

Only one of the surveyed restaurants occasionally has a possibility to offer lampreys on the menu. When it is in season, they buy raw lampreys directly from the fishermen. Several others see a potential to include lampreys into the menu.

When it comes to interest from the clients of the restaurants, they are part of the problem as they create little to no demand. Especially considering that lamprey season coincides with smelts season, and smelt is a beloved iconic fish of the region deeming lamprey to be a unnoticed. Two of the restaurants share their concerns that visitors are not aware of lampreys' existence let alone it's taste. However, they see potential in lamprey as a possible local niche produce. Also, lamprey season can be an advantage and smelt season can help in promoting lampreys as well.

Further education is needed as lampreys are not well known and some people think that this species are not suitable for human consumption. Also taking over best practices from Latvian neighbours in terms of recipes, advices and lessons learned from mistakes.

During the lamprey fishing season there is the interest showed by writing and publishing about lamprey and its fishing and eating traditions in newspapers and social media. The old traditions of lamprey fishing are described and some recipes provided.

In Lithuania there are two restaurants in Vilnius and Silute region which belongs to the same owner, who are following old times lamprey traditions. During the lamprey season the restaurant put outside the white flag with nine dots on it which shows that lamprey is ready to be served at the restaurant as it used to be. The restaurant serves a variety of lampreys prepared in different ways, for instance, stewed, smoked or marinated.

During the study period, it was visited all markets of Klaipeda city. The results showed that the smoked and fresh lamprey could be found in the main market (*Naujasis turgus*) of Klaipeda. The price for fresh lamprey was 7,99 Eur/kg and for the smoked lamprey it was 15 Eur/kg (December 2019). Also in a few specialised shops one can purchase fresh lampreys.

Overall, there are almost no lamprey products in retail and in market places only smoked lamprey can be found. The price of smoked lamprey in Vilnius (the capital city of Lithuania) is around 13 EUR/kg, about the same price it is in the fishing area in Nemunas delta, where the price for 1 smoked lamprey is 1 EUR.

3.1. Social aspects of lamprey use

Being the part of fishery, lampreys are the part of Latvian and Lithuanian historical development, part of tradition and intangible cultural heritage in coastal areas.

Social aspects of lamprey use in Kurzeme region and the potential to develop

Fishing with fish traps is known from the Stone Age – excavated in the wetland settlement site of Sārnate, near the Užava river. Fishing structures would almost certainly have been set up on the Užava to catch migrating salmon and perhaps also lamprey¹¹ allowing to presume that lamprey may have been an important food resource in prehistory¹².

Different gears (fyke nets, trammel nets, and lamprey weirs) are used in the different rivers. The type and design of the fishing gear may differ according to the distance from the sea, water depth and speed. Building up and dismantling of fish trap constructions was complicated manual work therefore social cooperation between fishers were needed. Historically fishing was organized by families, fishing skills were handed over within fishers' family to the next generations.

Substantial change happened in the sixties - seventies of the 20th century when traditional fishing by family members switched to collective farms (fishing kolkhozes). Nowadays lamprey catch is organized by private companies – holders of fishing rights. As the number of fishing gears is limited and the fishing season is quite short, the lamprey fishing is mainly a part time occupation. However, according to interviews, lamprey fishing is an important source of income, helping to provide jobs and to keep local population in coastal areas with low population density. The organisation of the fishing process differs among the rivers. In some fishing grounds fishermen are cooperating to each other so saving the operational costs, in some places mutual competition can be observed.

Lamprey industry can contribute to tourism industry –opportunity for the development of rural tourism products related to lamprey fishing or product processing and other lamprey-related cultural events exist. Recreational catching of lamprey is prohibited in Latvia; however, it is possible to join licenced fishers in lamprey catch. Offer of such recreation service is limited – during the study only one promoted offer to participate in lamprey fishing in Kurzeme region – offered by guest house located near the Rīva river¹³ was found. According to interviews with lamprey fishermen, access to recreation service is very rare at the moment and based on personal contacts, because the fishing is a working environment where safety as well as hygiene rules must be respected. To develop this tourism product as a business proposal, the special equipment (tourism boats etc.) would be needed, so this could be a niche, but for someone related to tourism, not fishery.

The lamprey fishing season does not overlap with traditional tourism season in Kurzeme region. The attraction of tourists in low season raises opportunities to diversify tourism offer and the potential of such service should be assessed in line with recreational service of lamprey processing, degustation etc. to create and offer local tourism product what in turn means high involvement level of local community and social cooperation.

According to the interviews with tourism specialist, an increasing flow of tourists to the Kurzeme region, including coastal areas has been observed, 7.8 M persons have visited coastal area of Kurzeme region in 2018, leaving each 65.71 EUR per day¹⁴. More than half of all territory guests are willing to have local food for dinner or at least for degustation. Seasonality in tourism is observed also in Venice. There are only two ways to tackle it: by developing the business tourism or by organising the public events (coastal fishing is a resource for such an event outside the traditional tourism season).

¹¹ Bērziņš V., 2008

¹² Bērziņš V., 2018

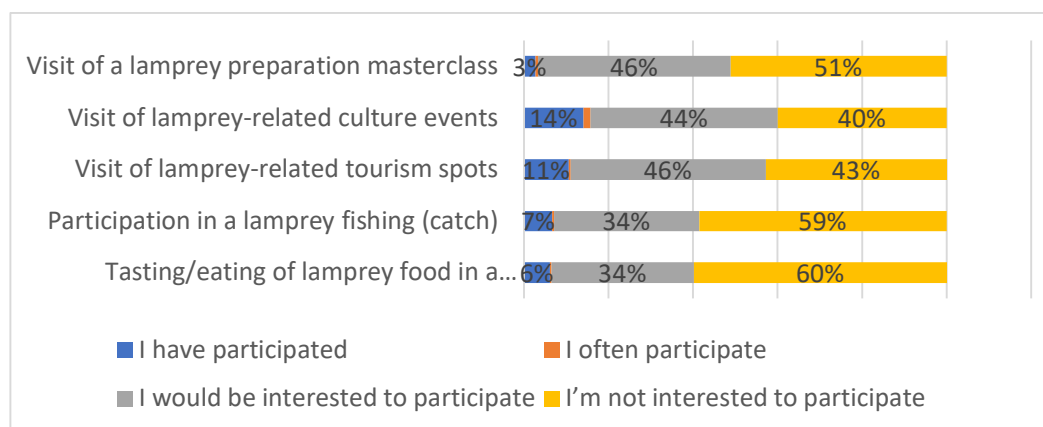
¹³ <http://www.imantas.lv>

¹⁴ Andris Klepers, Zivsaimniecības konference 2019

Inspired by well promoted lamprey events outside Kurzeme region (Carnikava, Salacgrīva), Pāvilosta local history museum organizes an event “Lamprey day in Pāvilosta” (near the Saka river) in November.

The Saka river is historical catch area where lamprey catch restarted in 1964 and lamprey processing site was constructed nearby. Lamprey products were sold outside Kurzeme region – Riga and Moscow¹⁵. Main purpose of the event it to promote lamprey eating in Kurzeme region and to honour local lamprey fishers. According to the interviews, such an event is interesting for local fish processors and traders – the sales during the Lamprey Day exceeded the sales amount in *normal autumn Sunday* three times.

According to the residents’ survey, there is an interest from the public, to participate in lamprey-related events (see figure 3.8). 44-46% of respondents would be interested to visit lamprey-related tourism spots, participate in lamprey preparation masterclass or to attend to lamprey-related cultural event and 1/3 of respondents would like to participate in lamprey fishing or to have a lamprey-products’ meal in a restaurant.



n= 511 total

Source: authors’ calculation based on residents’ survey, 2019

Figure 3.8. Evaluation of public willingness to participate in lamprey-related entertainment and/or culture events in Latvia

Considering the high prices of prepared lampreys in retail, it was interesting to evaluate, if the interest, observed in the residents’ survey, is solvent. Relationship between two variables (incomes per person in the household and interest to have lamprey meal in the restaurant) showed that 1/3 of respondents with incomes 300 – 1500 EUR/month per person in household would be interested in *tasting/eating of lamprey food in a restaurant*. The interest is falling (1/4) in the group of respondents with incomes more than 1500 EUR/month per person in the household.

During the study no restaurant was found with lamprey products in the seasonal menu, even in Pāvilosta, where the restaurant/tavern “Āķagals” is located directly at the Saka river, where lamprey fishing takes place. On the other hand, considering that market capacity exceeds the actual availability of lamprey, perhaps there is no need for special meal offer in the restaurants.

There are two specialized fish restaurants (“Zivju lete” located in Riga and “Bermudas” located in Lapmežciems (Pierīga region, coastal area), where it is possible to pre-order fried or grilled lampreys. The representative from “Bermudas” replied that they were thinking about the possibility to include lamprey meal in the restaurant’s seasonal menu, in the future.

¹⁵ <http://www.laukutikls.lv/nozares/zivsaimnieciba/raksti/jaunas-tradicijas-pirmsakumi-negu-diena-pavilosta>

Social aspects of lamprey use in Klaipeda and Telsiai counties and the potential to develop

The representatives of administrative body, which presents ethno cultural side of lamprey fishing and consumption traditions, were interviewed. Representatives expressed positive opinion about the lamprey as resource for the development of the region. The weaknesses identified were lack of information and lack of initiative from fishermen. According to the interviews, the lamprey has a big social, economic and environmental value, because it is a part of Lithuanian Minor heritage, which is forgotten nowadays. The regional economy related to lamprey could be increased, if the lamprey catches would not be sold to Latvia, but would stay in Lithuania. It possibly could be reached within collaboration among fishermen, restaurants, tourism organisations and the local government. Also, it is important to inform and educate about the lamprey fish and resources in other Lithuanian regions. It could help to increase the consumption, because at the moment people do not know what kind of fish is lamprey, how to process or use and cook it.

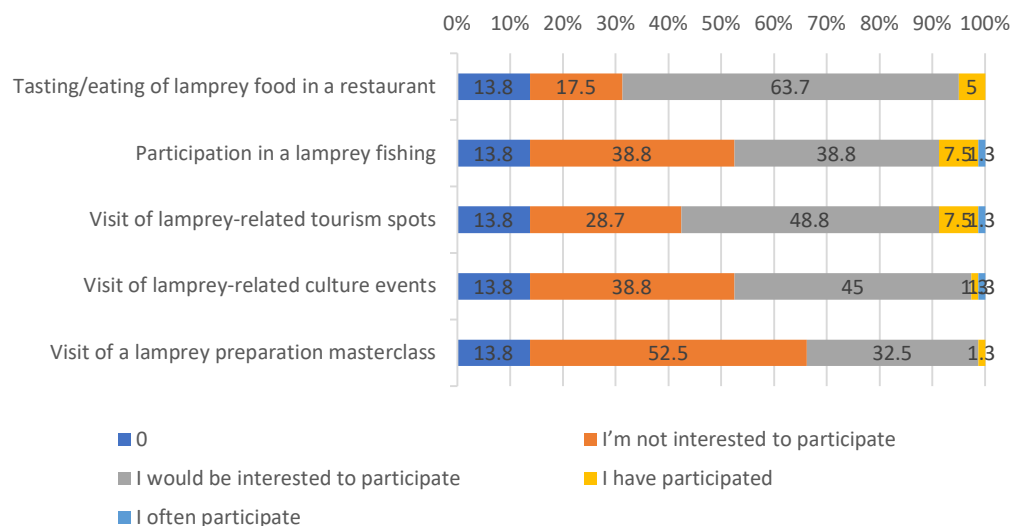
In order to increase the awareness and popularity of Lithuanian culinary heritage, the Lithuanian Countryside Tourism Association implements the project "Traditional Lithuanian Food Guide". The aim of it is to raise awareness among the public, especially the younger generation, about the local food culture in Lithuania, and to express the respect for the people, who follow the culinary traditions of our grandparents and parents, and cook according to old recipes and technologies.

Lithuanian Minor is a part of the Curonian Spit, districts of Silute and Klaipeda and the southern part of Taurage County. The inhabitants of Lithuanian Minor called themselves *lietuvinkai* and differed from the Lithuanians of the Grand Duchy of Lithuania. The oldest knowledge about the dishes made in Lithuania comes from Prussian times. The favourite fish of the seafront inhabitants were stewed smelt, grilled lampreys and burbot boiled in milk. The fish was fried in frying pans only after the World War I. Fishermen of the Curonian Lagoon villages were less likely to cook fish soup, but they liked to stew fish in a bakery oven. For longer storage, the fish was salted, dried and smoked. *Lietuvinkai* used to dry the fish in a chimney of the house, before keeping it salted in a wooden barrel for a couple of weeks. On the seafront, it was a tradition to dry the fish outdoors. Fish smoking became more popular only in the 20th century. At that time, fish smokers were begun to be built in the villages by the lakes¹⁶.

In spite of cultural heritage and in spite of lamprey fishing season deviates from regular tourism season (which is mostly seen as advantage and a potential to prolong the tourism season), tourism organizations do not see lamprey as a fish, that may attract tourists to the region. Recreational fishing alone is not very well developed in the region and appears to be more of a niche market. So, there are no tourism products in place at the moment in Lithuania, that would be dedicated to lamprey. Tourism representatives see some measures, that could be taken: good practice use from Latvia, publishing recipe books, TV shows, increased quotas.

However, according to the residents' survey, there is observed interest from the respondents, to participate in lamprey-related events in Lithuania (see figure 3.9.). That bears a promise of demand for possible tourism services in the future. If local efforts started to arise, regional tourism could lift up the lamprey related activities. Off season thematical tourism products, such as cultural events including fishing and tasting activities, could be introduced. According to the survey, respondents having income in the range of 501 - 1200 EUR are very interested in tasting lampreys in the restaurant 23,8% and 21,3% respectively. This group presents to be most interested to engage in various lamprey-related activities comparing to other groups.

¹⁶ Lithuanian Countryside Tourism Association, 2019



Source: authors' calculation based on the residents' survey results in Lithuania, 2019

Figure 3.9. Participation in lamprey-related entertainment and/or culture events in Lithuania

The results of interviews with several coordinating organisations showed, that the opinions differ about the importance of lamprey stock to the regional development. In opinion of one of coordinating organisations, the lamprey as a part of fishery do not have visible social, environmental or economic value, but there is a potential to grow as economic activity. For reaching it the fishing conditions have to be changed, for instance, new fishing gears, which makes easier lampreys fishing. The low level of consumption was another limiting factor, that was mentioned, because the potential consumer is not informed about the lamprey consumption traditions and nutrition values.

On the other hand, the representatives from the other coordinating organisation sees lamprey as potential and good economic activity in Lithuania. At the moment lampreys' prices are increasing and that is increasing the interest of fishermen in Curonian Lagoon. Therefore, the opportunities to get EU support for investments in new fishing gears for lamprey fishing could be possible. The catches of lamprey fish would increase if Ministry of Environment would increase quotas. Based on our data, the amount of catches is not decreasing but sometimes the catches could be affected by the environmental factors or conditions. For instance, low water level, and temperature or because of the climate warming the fish migration time is changing, but not according to our regulations at the moment. It is very important the revitalization of traditions and consumption of lamprey. At the moment there is only smoked lamprey offered in the market and the prices are currently unaffordable compared to other fish available on the market in Lithuania.

3.2. Environmental aspects of lamprey use

Due to the stable market demand and high price, river lamprey is one of the most important target species for inland fishing in Latvia. Although consumption of lamprey products is almost non-existent in Lithuania, it is exported as a raw material and sold for consumption in Latvia. However, it has a special protected species status and commercial exploitation of lamprey is possible as long as the species' ability to regenerate is not endangered. The status of the lamprey stocks can be judged from the reported catches - according to the previous studies implemented by BIOR researchers, fishing mortality is assumed to be about 40% of the lampreys' population coming to rivers for spawning.

Outside the fishing, lamprey population is affected by a number of other factors of both natural and anthropogenic origin. The ability of the lamprey to regenerate naturally, both by obstructing the migration of the lampreys to spawning grounds and by reducing the areas of natural spawning, is most

significantly affected by the development of hydroelectric power stations and other dams. The ability of the lamprey to migrate to spawning grounds is also adversely affected by improperly constructed culverts and other obstructions - objects left in the rivers (remains of ancient buildings or unfinished structures or construction waste), whose being in the river cannot be rationally explained¹⁷. There is an activity within the LAMPREY project to identify the river barriers in the Kurzeme rivers and highlight the strategically most important points obstructing lamprey natural spawning.

Legal framework for lamprey stock management and maintenance in Latvia

Several activities are carried out for the management and conservation of the lamprey stock in Latvia:

- restrictions on lamprey fishing (permanent);
- harvesting and incubation of lamprey eggs (each year, variable volume);
- monitoring of lamprey larvae (irregular);
- purchase and transfer of lampreys across migration barriers (irregular, projects' activity);
- control of illegal fishing (permanent);
- removal of obstruction in the lamprey spawning rivers (projects' activity);
- marking of lamprey (first time in Latvia within the scope of this project)

The restrictions on lamprey fishing in Latvia includes seasonal closures and limited number of fishing gears for licensed fishing. The limit of 97 fyke-nets in Kurzeme region and total allowed amount of gears has not changed since 2015, except some minor changes like number of fishing gears set jointly in one row or position of row to coast. Currently, river lamprey fishing in Kurzeme region is carried out at 15 fishing grounds on 9 rivers. The length of the closed season of the Irbe, Venta, Užava, Saka rivers is from 01 February till 31 July, but the Grīva, Roja, Pilsupe, Melnsilupe and Rīva rivers – from 01 February till 31 October.

According to the interviews, lamprey fishermen are satisfied with current regulation and there are no proposals for any changes. The only comment regarding fishing season was about the Rīva river, fishing season starts on November there, but till then illegal fishing happens, because the lampreys start to come into the river earlier.

Lamprey population is subject of restocking since 1980s¹⁸. Release of lamprey larvae to natural waters takes place every year. Restocking is financed by the state, municipalities and is performed on social cooperation basis – representatives of BIOR, local municipalities, local lamprey fishers or boat owners are attracted in restocking of biological stock.

10-year (2008-2017) Latvian average lamprey larvae release to natural water is 12.4 million pieces varying from 15.3 M pcs. in 2015, 10.8 M pcs. in 2016 and 19.3 M pcs. in 2017. Most of lamprey larvae release takes place in the main catch areas outside of Kurzeme region. Largest volumes of lamprey larvae are released to the Daugava river to minimise anthropogenic impact of the Daugava hydro power station cascade of 3 stations.

Lamprey larvae release to the Venta river basin is financed by the state under common program for the Venta and the Gauja rivers. Total planned lamprey larvae release (3.5 M p a) to the Venta and the Gauja rivers was exceeded by 30% during 2011 – 2015 (average 4.5 M p a)¹⁹. For following planning period of 2016 – 2020 planned lamprey larvae release was increased to 5.0 M p a. in line with conclusion that habitats of lamprey larvae in the Gauja and the Venta rivers are sufficient but increase is necessary for raising of opportunities for commercial catch.

Despite the increase of lamprey larvae release under common program for the Venta and the Gauja rivers, actual statistics demonstrate the lack of regular release and low release volumes to the Venta

¹⁷ Abersons K., 2019

¹⁸ Rjapolova N., Mitāns A., 2012

¹⁹ Par Zivju resursu mākslīgās atražošanas plānu 2017.-2020. gadam

river. Lamprey larvae release to the Venta river happened irregularly from 2007 to 2010 (3 85 M pcs. 4-year total) and then again only in 2017 (2 4 M pcs.).

According to the public information by local municipalities²⁰ and BIOR plans for lamprey larvae release²¹, in 2019 lamprey larvae release of 7 M is expected in the Daugava basin rivers and 5 M in the Gauja basin rivers (see table 3.7).

Table 3.7. Dynamics of lamprey larvae release in Latvia rivers 2008 - 2017

River	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total release	11 562	7 200	15 623	11 490	12 775	11 816	8 995	15 293	10 786	19 280
Daugava basin rivers	5 688	2 500	12 412	7 051	7 829	5 971	5 345	9 493	5 286	12 380
Gauja	4 624	2 400	3 131	4 439	4 946	5 845	3 650	3 800	3 500	4 500
Salaca	0	0	0	0	0	0	0	2 000	2 000	0
Venta	1 250	2 300	80	0	0	0	0	0	0	2 400
Venta, %	11%	32%	1%	0%	0%	0%	0%	0%	0%	12%

Source: BIOR

The effectiveness of the stocking of lamprey larvae has not been proved²² and according to BIOR, opportunities to assess larvae release effect to lamprey stock are higher in small rivers of non-economic importance.

Lamprey larvae breeding as part of public fish resource renewal program or specific programs is offered by 3 BIOR fish farms (Kārļi, Dole, Pelči), one of those located in Kurzeme region (Pelči). These fish farms have unique knowledge of lamprey larvae breeding, and according to BIOR, Latvia is the only place in the world where lamprey larvae are bred.

Besides of the state program and project funds²³, some restocking costs are included in fishermen expenses - fees of lease of commercial fishing rights and utilisation of fishing rights in public waters (including coastal area) and inland waters collected by municipalities at least partially are dedicated for purchase of young fish/larvae²⁴.

BIOR regularly tenders purchase of breeding lampreys. According to the tender requirements for season 2019/20, expected deliveries are 480 kg of lamprey from the Gauja river exclusively and 240 kg from either the Gauja/the Daugava river, meaning BIOR is one of key market participants (consumers) of the Gauja river lampreys (at least 10% of 2018 total catch in the Gauja river). Current price (September 07, 2019) of lamprey larvae as aquaculture product is 1 82 EUR including VAT per 1 000 pcs²⁵ and there are no private fish farm offer in the market.

According to the interviews, stakeholders welcome restocking program and point that in Kurzeme region this activity could be implemented to a wider extent, of course, if effectiveness is measurable.

Alternative restocking opportunity is to move breeding lamprey over barriers to their spawning sites. This allows to use for spawning those river areas, that are appropriate for it, but where lampreys cannot migrate because of any dam. This has not been a regular activity in Latvia, and effectiveness of it has not been calculated. But, according to the interviews, stakeholders believe that it could help to raise opportunities for commercial catch.

The information regarding illegal fishing and its control analysed at section 3 1. According to the interviews, illegal fishing is decreasing lately: environmental inspectors have good collaboration with

²⁰ <https://www.godskalpotrigan.lv/daugava-ielasti-negu-kapuri/>

²¹ BIOR, 2019

²² Birzaks J., Abersons K., 2011

²³ https://www.salacgriva.lv/lat/salacgrivas_novads/?text_id=47956?text_id=47956

²⁴ <http://carnikava.lv/karte/17-latviesu/jaunumi/pasvaldiba/426-gauja-ielasti-3-miljoni-negu-mazulu>

²⁵ <https://bior.lv/en/services/lamprey-larvae>

anglers, who informs if illegal activities observe, and also legal lamprey fishermen look after their rivers, making the control process more effective.

It has been concluded that catch size could be about 40% of all lamprey migration to rivers, but might not correspond to the actual size of the lamprey population²⁶ and for proper lamprey stock assessment other data sources like monitoring of river lamprey larvae (ammocoetes) should be used²⁷. In recent years scope of monitoring has expanded from main lamprey catch areas to smaller rivers including rivers of Kurzeme region. However, the monitoring results are hard to interpret, and, so far, they have not been used to evaluate the status of the lamprey stock.



Figure 3.10. SWOT for the existing system for the conservation and management of lamprey stocks in Latvia

The implementation of the lamprey stock management and conservation measures in wider amount would be a matter of enlarged public expenses. According to the residents' survey results, respondents have expressed support for the conservation of lamprey stocks. On opinion of 56% of respondents' conservation of lamprey stock is important: lampreys are as important as keeping the traditions of the local community, while for 26% of respondents the conservation of lamprey stock is very important: lamprey is as important, as preservation of the tradition of General Latvian Song and Dance Celebration in Latvia. This evaluation can be used to illustrate in what amount the public would be willing to pay for the lamprey' stock management and conservation measures.

Legal framework for lamprey stock management and maintenance in Lithuania

River lamprey catch limit in Lithuania is set by the Ministry of Environment. For a fishing period of 4 years there are organized auctions for Individual Transferable Quotas in the Svetoji River for 1,5 t and the Nemunas River Delta for 2 t. In the Svetoji river, fyke nets are used to catch lampreys and in the Nemunas river, it is only allowed to fish with lamprey cone traps. Lamprey fishery in Curonian Lagoon is regulated by setting gear limit. In the Lithuanian part of the Curonian Lagoon, it is allowed to use 32

²⁶ Abersons K., Birzaks J., 2014.

²⁷ BIOR, 2013.

lamprey fyke nets with 5-10 mm mesh size limit for a hoop net. Additionally, it is considered possibility to introduce 20 specialised ruffe-stickleback fyke nets that would also target lampreys. There is also set a closure period for the lamprey fishery from January 1 to September 15 in all fishing grounds.

Also, lamprey larvae monitoring in Natura2000 territories are implemented on 3-year cycle basis, but the larvae density results are not converted into stock status information so far, only used to evaluate conservation status of lamprey population in protected area.

According to the interviews, the majority of Curonian lagoon fishermen are concerned about the poaching - illegal fishing because they think that it effects their income from lamprey fishing. From the existing system for regulating lamprey fishing fishermen completely dissatisfies the length of the lamprey fishing season. They would like to prolong the lamprey fishing season due to the main reason - the yearly temperature changes because it gets colder later at the fishing season. The amount of the quota allocated satisfies the fishermen of Curonian Lagoon. Curonian Lagoon fishermen do not have a strong opinion on measures taken to conserve lamprey stocks. The only one fisherman thinks that elimination of mechanical pollution (barriers) in spawning rivers significantly improves lamprey stock.

Nemunas river fisherman partly dissatisfies the end of the lamprey fishing season and partly satisfies the length of the lamprey fishing season. The fishermen are completely satisfied with the start of the lamprey fishing season, the amount of the quota allocated, number of authorized fishing gear and catch reporting arrangements. In the opinion of fisherman, the movement of breeding lampreys from one river to another and elimination of mechanical pollution (barriers) in spawning rivers on fishermen opinion would significantly improve lamprey stock.

The possible changes to the lamprey fishery management system is the permission to start the lamprey fishing season later than now and the extension of the lamprey fishing season.

The fisherman would not support: the permission to start the lamprey fishing season earlier than now, the shortening of the lamprey fishing season, the increase or reduction of the number of fishing gear, the increase or reduction of fishing quota, permission of new fishing places (rivers or spots) or reduction of them, introduction of an additional charge (for lamprey fishing) to compensate the public costs of conservation and maintenance of the lamprey stock, the link of the fees for fishing gear (quota) to actual catches (less catch, less payment and vice versa).

The fishermen of Svetoji River have a strong opinion about their small fishing quotas and they would like to increase it. In their opinion, the measures taken to conserve lamprey stocks which significantly improves lamprey stock are the collection, breeding and leasing of lamprey larvae (lamprey fry) in rivers, the movement of breeding lampreys from one river to another and elimination of mechanical pollution (barriers) in spawning rivers.

The Svetoji river fishermen said that illegal fishing is a huge problem in area and it effects lamprey price, the amount of catches (authorized), the maintenance of the lamprey stocks, the income of legal fishermen.

The majority of Svetoji river fishermen would support the possible changes to the lamprey fishery management system: the extension of the lamprey fishing season, the tighter control/ restriction of the illegal fishing of lamprey, additional measures for conservation and maintenance of the lamprey stocks and the minority would support the link of the fees for fishing gear (quota) to actual catches (less catch, less payment and vice versa).

According to the survey results, respondents of the Klaipeda and Telsiai counties recognize significance of lost for nature, if the lamprey disappeared in the Baltic Sea. According to the survey 49% of respondents believe that conservation of lamprey stocks is as important as the traditions of the local community and for 25% of respondents the conservation of lamprey stocks is as essential, as keeping traditions of Lithuania.

Conclusions

River lamprey is one of the most important target species for inland fishing in Latvia due to the stable market demand and high price. Although the availability of the resource is limited, lamprey fishing creates several economic benefits in the Kurzeme region:

- 1) incomes from the sale of catches. Lamprey fishing is seasonal, so it does not provide an income stream for fishermen throughout the year, however, the study reveals the high economic importance of lamprey fishing as an additional activity.
- 2) preservation of employment opportunities. The study reveals that Kurzeme region has lower population density than the average in Latvia. Consequently, maintaining employment and income gaining opportunities in these areas is important also for the balanced regional development.
- 3) raw material for fish processing. There is only small scale (home) processing for lamprey in Kurzeme, thus the region does not gain any added value that could be generated by additional income and employment, but the resource is exported to other regions of Latvia and there the value added is created.
- 4) raw material for the production of a traditional food products with delicacy status in Latvia. The study reveals that the market capacity of consumption of lamprey products in Kurzeme region exceeds the availability of the resource.
- 5) potential to be a part of local offer for tourism. The lamprey fishing does not overlap with the traditional tourist season in Kurzeme region and especially coastal areas; however, the Latvian tourism specialists see the potential of local fishery to be involved into the development of tourism offers and visitors attraction outside the traditional tourism season.

Lamprey fishing and processing also contributes to the creation of social benefits in Kurzeme region. Lamprey fishing, as well as lamprey processing, although advanced in materials nowadays, retains a large amount of hand work, so traditional skills, cultural and historical heritage can be preserved practically and interactively. The maintenance of local traditions is one of the values expressed in the residents' survey with influence to the local quality of life.

Also, according to the residents' survey results, respondents highly evaluates nature values of surroundings, including maintenance of biodiversity. While the status of river lamprey stock allows the commercial exploitation of the species, it is possible to gain the widest scope of benefits generated or supported by lamprey. Respondents have expressed support for the conservation of lamprey stocks. More than a half of respondents find conservation of lamprey stock as important and more than 1/4 of respondents find it to be essential.

Although the fish and the sea products have a significant role in the Lithuanian households. The research results showed that the lamprey is not an economically significant fish the Klaipeda and Telsiai counties. The importance of the river lamprey for the society and local economy is quite low at the moment. As the lamprey is not as well-known fish and also not widely used in Lithuania. The lamprey fish is not very well-known fish at the moment compared to other local fish, for instance smelt, but the majority of local residents would be interested to taste the lamprey and/or participate in the events related to lamprey fish. Also, local residence would be interested for visiting of lamprey-related tourism spots, culture events and this opens the door of possibilities for the reminding the traditions of lamprey fishing and consumption for the local community. With that said, we can conclude that there is the potential and interest for the lamprey fish and fishing which could contribute to the social well-being in the study area.

Morover, the local residents of study area recognize significance of lost for nature, if the lamprey disappeared in the Baltic Sea, also believe conservation of lamprey stocks is as important as the traditions of the local community and the conservation of lamprey stocks is essential as keeping traditions of Lithuania.

The research results demonstrated the need for further education as lampreys are not well known because some of survey people think that this species is not suitable for human consumption. On the other hand, nowadays some local restaurants are interested to including lamprey related dishes in their menu. One of the reasons because older times lamprey was evaluated as a special dish with the rich nutrition. At the moment, it is too expensive and hard to get it from the local fishermen or markets because most of the catches are bought by Latvian buyers.

While reporting fishermen are not always fully reporting the correct amounts of their lamprey catch as well as the selling prices. As far as the data goes, there are differences in reporting, creating further difficulties to data comparability. From the existing system for regulating lamprey fishing fishermen completely dissatisfies the length of the lamprey fishing season. They would like to prolong the lamprey fishing season due to the main reason - the yearly temperature changes because it gets colder later at the fishing season.

Therefore, the study opens new possibilities to the Lithuanian side of the lamprey resources and fishing as businesses development and also, opportunities to revive this cultural heritage.

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Residents' survey questionnaire

Q1	How important to your welfare and life quality are following aspects of your life:						
		Not at all important	Slightly important	Moderate	Fairly important	Very important	No opinion
Q1_1	Work opportunities close to home						
Q1_2	Leisure opportunities close to home						
Q1_3	Sense of community – celebration of community events/festivals, common values						
Q1_4	Preserving of traditions						
Q1_5	Availability of the local food						
Q1_6	Nature's diversity						
Q1_7	Cleanliness of surroundings						
Q1_8	Landscape visual quality						
Q1_9	Attractive environment for tourism, presence of tourism spots						
Q2	Does your or somebody's in your household diet consist of fish and other freshwater and seafood?	Yes					
No							
Q3	Lamprey is... (please mark the description which best applies, several answers are possible)	a protected species					
a symbol							
an aquatic animal sometimes taken for human consumption							
a delicacy							
unsavoury							
no opinion							
Q4	Please evaluate lamprey eating traditions in your family (several answers are possible):	somebody in my family has lampreys in his/her diet					
somebody of my parents/grandparents has/had lampreys in his/her diet							
nobody in my family has lampreys in his/her diet							
nobody of my parents/grandparents has/had lampreys in his diet							
no opinion							
Q5	Have you ever eaten (tasted) lamprey or lamprey products?	yes, and I have them in my diet					
yes, but I don't have them in my diet							
no							
If answer to Q5 is "yes, but I don't have them in my diet" or "no", then (Q6-Q12):							
Q6	What are main reasons why you don't have lampreys in your diet?	not available					
can't afford/too expensive							
unappetizing look							
unpalatable							
because of ethical / moral reasons							
other reasons (please mention)							

Q7	How often do you eat lampreys?	less than once per year					
		1 – 3 times per year					
		4 – 6 times per year					
		6+ times per year					
Q8	Please evaluate how do following aspects affect your lamprey eating habits (please rate):						
		Not at all	Slightly	Moderate	Fairly	Very	No opinion
Q8_1	Price						
Q8_2	Access (availability to buy)						
Q8_3	Necessity (celebrations, traditions)						
Q8_4	Mood						
Q8_5	Other (please mention) _____						
Q9	Do your lamprey eating habits during last 3 years differ from your previous routine? Please evaluate statement “For the last three years I have eaten lampreys...”	more often than previously					
		rarer than previously					
		the same like before					
		can't evaluate					
Q10	Please evaluate what had affected your lamprey eating habits during last three years:						
		Not at all	Slightly	Moderate	Fairly	Very	No opinion
Q10_1	Changes of lamprey price						
Q10_2	Changes of personal welfare						
Q10_3	Access of lampreys (availability to buy)						
Q10_4	Change of personal taste/dietary habits						
Q10_5	Information about lampreys and cooking options in mass media and social networks						
Q11	Where do you usually buy lampreys?	from lamprey fishers					
		from lamprey producers					
		in fair events or community celebrations					
		in the specialized fish shops					
		in a market					
		in a supermarket					
		in a restaurant					
		other options (please mention) _____					
Q12	My first choice is lamprey products by lamprey producer / company (please mention name or brand name) _____						
Q13	Please evaluate lamprey products (prepared) retail price in October 2019	up to 20 EUR/kg					
		20 – 25 EUR/kg					
		26 – 30 EUR/kg					
		31 – 35 EUR/kg					
		above 35 EUR/kg					
		No opinion					

Q14	Please evaluate consumption of the lamprey/lamprey products in your household (per one person per meal):	less than one lamprey per person					
		1 – 2 lampreys per person					
		more than two lampreys per person					
Q15	Please evaluate possible changes in the lamprey consumption if lamprey product price would fall by 25% (1/4).	will not change substantially					
		will increase slightly (less than a fourth)					
		will increase by a fourth					
		will increase by more than a fourth					
Q16 In what lamprey-related entertainment and/or culture events you participate, or you would like to participate?							
		I'm not interested to participate	I would be interested to participate	I have participated	I often participate		
Q16_1	Tasting/eating of lamprey food in a restaurant						
Q16_2	Participation in a lamprey fishing (catch)						
Q16_3	Visit of lamprey-related tourism spots						
Q16_4	Visit of lamprey-related culture events						
Q16_5	Visit of a lamprey preparation masterclass						
Q17	How significant lost for the nature that would be on your opinion, if the lamprey disappeared in the Baltic Sea (Lithuania):	preservation of lamprey stocks is not important; their disappearance would not worry me					
		conservation of lamprey stocks is important; they are as important to me as, for example, keeping the traditions of the local community					
		conservation of lamprey stocks is essential; they are as important to me as, for example, keeping the tradition of Lithuania					
	Some general questions						
Q18	Gender	Female					
		Male					
Q19	Age	under 20					
		20-35					
		36-50					
		51-65					
		over 65					
Q20	Municipality	_____					
Q21	Number of persons in your household	_____					
Q22	Average income of your household per person per month	up to 200 EUR					
		201 – 500 EUR					
		501 – 800 EUR					
		801 – 1200 EUR					
		more than 1200 EUR					

Residents' survey results in Kurzeme region**Q1 Aspects important to welfare and life quality [Work opportunities close to home]**

	Total	Kurzeme	Riga + Pieriga
Not at all important	4.3%	4.3%	4.3%
Slightly important	4.7%	3.1%	6.2%
Moderate	13.5%	11.0%	16.0%
Fairly important	36.4%	37.0%	35.8%
Very important	39.9%	43.3%	36.6%
No opinion	1.2%	1.2%	1.2%
n=	511	247	254

Q1 Aspects important to welfare and life quality [Leisure opportunities close to home]

	Total	Kurzeme	Riga + Pieriga
Not at all important	10.4%	9.8%	10.9%
Slightly important	12.9%	12.6%	13.2%
Moderate	23.7%	23.6%	23.7%
Fairly important	32.9%	33.9%	31.9%
Very important	18.2%	17.7%	18.7%
No opinion	2.0%	2.4%	1.6%
n=	511	247	254

Q1 Aspects important to welfare and life quality [Sense of community]

	Total	Kurzeme	Riga + Pieriga
Not at all important	5.7%	4.3%	7.0%
Slightly important	5.9%	5.5%	6.2%
Moderate	13.1%	11.8%	14.4%
Fairly important	38.0%	40.9%	35.0%
Very important	36.0%	37.0%	35.0%
No opinion	1.4%	0.4%	2.3%
n=	511	247	254

Q1 Aspects important to welfare and life quality [Preserving of traditions]

	Total	Kurzeme	Riga + Pieriga
Not at all important	3.9%	3.1%	4.7%
Slightly important	5.3%	5.5%	5.1%
Moderate	15.7%	15.4%	16.0%
Fairly important	38.9%	38.6%	39.3%
Very important	35.2%	37.0%	33.5%
No opinion	1.0%	0.4%	1.6%
n=	511	247	254

Q1 Aspects important to welfare and life quality [Availability of the local food]

	Total	Kurzeme	Riga + Pieriga
Not at all important	2.2%	1.6%	2.7%
Slightly important	4.1%	4.7%	3.5%
Moderate	12.7%	11.4%	14.0%
Fairly important	37.6%	40.2%	35.0%
Very important	43.2%	42.1%	44.4%
No opinion	0.2%	0.0%	0.4%
n=	511	247	254

Q1 Aspects important to welfare and life quality [Nature's diversity]

	Total	Kurzeme	Riga + Pieriga	
Not at all important	1.0%	1.2%	0.8%	
Slightly important	3.1%	3.5%	2.7%	
Moderate	6.8%	6.7%	7.0%	
Fairly important	40.3%	41.7%	38.9%	
Very important	47.4%	45.7%	49.0%	
No opinion	1.4%	1.2%	1.6%	
n=	511	247	254	

Q1 Aspects important to welfare and life quality [Cleanliness of surroundings]

	Total	Kurzeme	Riga + Pieriga	
Not at all important	0.6%	0.0%	1.2%	
Slightly important	1.2%	1.2%	1.2%	
Fairly important	1.8%	2.4%	1.2%	
Very important	21.7%	23.6%	19.8%	
No opinion	74.2%	72.8%	75.5%	
n=	511	247	254	

Q1 Aspects important to welfare and life quality [Landscape visual quality]

	Total	Kurzeme	Riga + Pieriga	
Not at all important	0.2%	0.0%	0.4%	
Slightly important	1.2%	0.8%	1.6%	
Moderate	3.5%	3.5%	3.5%	
Fairly important	26.8%	29.9%	23.7%	
Very important	68.1%	65.7%	70.4%	
No opinion	0.2%	0.0%	0.4%	
n=	511	247	254	

Q1 Aspects important to life quality [Attractive environment for tourism, presence of tourism spots]

	Total	Kurzeme	Riga + Pieriga	
Not at all important	6.7%	5.9%	7.4%	
Slightly important	11.2%	10.2%	12.1%	
Moderate	20.5%	18.9%	22.2%	
Fairly important	33.5%	35.0%	31.9%	
Very important	27.2%	29.5%	24.9%	
No opinion	1.0%	0.4%	1.6%	
n=	511	247	254	

Q3 Lamprey is...

	Total	Kurzeme	Riga + Pieriga	
a protected species	9.0%	9.2%	8.9%	
a symbol	26.1%	28.2%	24.2%	
an aquatic animal sometimes taken for human consumption	51.5%	50.0%	52.9%	
a delicacy	10.4%	10.8%	10.1%	
unsavoury	3.0%	1.9%	4.0%	
don't know what it is	9.0%	9.2%	8.9%	
n=	643	316	327	

Q4 Lamprey eating traditions evaluation

	Total	Kurzeme	Riga + Pieriga	
somebody in my family has lampreys in his/her diet	35.5%	35.1%	35.5%	
somebody of my parents/grandparents has/had lampreys in his diet	39.0%	37.3%	39.0%	
nobody in my family has lamprey in his/her diet	14.7%	17.6%	14.7%	
nobody of my parents/grandparents has/had lampreys in his diet	4.7%	4.7%	4.7%	
no opinion	6.1%	5.3%	6.1%	
n=	511	247	254	

Q5 Ever eaten (tasted) lamprey or lamprey products

	Total	Kurzeme	Riga + Pieriga
yes and I have them in my diet	47.4%	45.3%	49.4%
yes, but I don't have them in my diet	41.5%	46.5%	36.6%
no	11.2%	8.3%	14.0%
n=	511	247	254

Q6 Main reasons to exclude lampreys from the diet

	Total	Kurzeme	Riga + Pieriga
less than once per year	13.1%	15.1%	10.9%
can't afford/too expensive	29.0%	34.1%	23.6%
unappetizing look	13.9%	9.2%	19.0%
unpalatable	28.4%	28.6%	28.2%
because of ethical / moral reasons	7.2%	8.1%	6.3%
other reasons (please mention)	8.4%	4.9%	12.1%
Total			

Q7 Frequency of lamprey consumption

	Total	Kurzeme	Riga + Pieriga
never	13.2%	21.7%	5.5%
1 - 3 times per year	46.7%	47.0%	46.5%
4-6 times per year	24.8%	19.1%	29.9%
More than 6 times per year	15.3%	12.2%	18.1%
n=	242	115	127

Q8 Aspects affecting lamprey eating habits [Price]

	Total	Kurzeme	Riga + Pieriga
Not at all	4.1%	2.6%	5.5%
Slightly	5.8%	4.3%	7.1%
Moderate	12.8%	7.8%	17.3%
Fairly	25.6%	31.3%	20.5%
Very	50.8%	52.2%	49.6%
No opinion	0.8%	1.7%	0.0%
n=	242	115	127

Q8 Aspects affecting lamprey eating habits [Access]

	Total	Kurzeme	Riga + Pieriga
Not at all	9.1%	8.7%	9.4%
Slightly	8.7%	8.7%	8.7%
Moderate	17.8%	15.7%	19.7%
Fairly	37.2%	34.8%	39.4%
Very	26.0%	29.6%	22.8%
No opinion	1.2%	2.6%	0.0%
n=	242	115	127

Q8 Aspects affecting lamprey eating habits [Necessity]

	Total	Kurzeme	Riga + Pieriga
Not at all	11.2%	10.4%	11.8%
Slightly	9.9%	10.4%	9.4%
Moderate	26.4%	26.1%	26.8%
Fairly	31.4%	28.7%	33.9%
Very	18.2%	20.0%	16.5%
No opinion	2.9%	4.3%	1.6%
n=	242	115	127

Q8 Aspects affecting lamprey eating habits [Mood]

	Total	Kurzeme	Riga + Pieriga
Not at all	10.7%	9.6%	11.8%
Slightly	12.0%	12.2%	11.8%
Moderate	25.6%	28.7%	22.8%
Fairly	28.5%	31.3%	26.0%
Very	21.5%	15.7%	26.8%
No opinion	1.7%	2.6%	0.8%
n=	242	115	127

Q8 Aspects affecting lamprey eating habits [Other]

	Total	Kurzeme	Riga + Pieriga
Not at all	12.9%	9.5%	15.7%
Slightly	3.2%	0.0%	5.9%
Moderate	2.2%	4.8%	0.0%
Fairly	6.5%	9.5%	3.9%
Very	20.4%	19.0%	21.6%
No opinion	54.8%	57.1%	52.9%
n=	242	115	127

Q9 Change in lamprey eating habits during last 3 years

	Total	Kurzeme	Riga + Pieriga
more often than previously	8.3%	6.1%	10.2%
rarer than previously	39.7%	41.7%	37.8%
the same like before	49.6%	48.7%	50.4%
can't evaluate	2.5%	3.5%	1.6%
n=	242	115	127

Q10 Reasons for change in lamprey eating habits during last 3 years [Changes of lamprey price]

	Total	Kurzeme	Riga + Pieriga
Not at all	12.4%	8.7%	15.7%
Slightly	11.2%	7.0%	15.0%
Moderate	12.4%	13.0%	11.8%
Fairly	25.2%	27.8%	22.8%
Very	33.9%	37.4%	30.7%
No opinion	5.0%	6.1%	3.9%
n=	242	115	127

Q10 Reasons for change in lamprey eating habits during last 3 years [Changes of personal welfare]

	Total	Kurzeme	Riga + Pieriga
Not at all	27.7%	23.5%	31.5%
Slightly	15.3%	9.6%	20.5%
Moderate	22.7%	27.8%	18.1%
Fairly	20.2%	23.5%	17.3%
Very	11.6%	12.2%	11.0%
No opinion	2.5%	3.5%	1.6%
n=	242	115	127

Q10 Reasons for change in lamprey eating habits during last 3 years [Access of lampreys]

	Total	Kurzeme	Riga + Pieriga
Not at all	18.6%	18.3%	18.9%
Slightly	13.2%	12.2%	14.2%
Moderate	24.8%	20.0%	29.1%
Fairly	23.1%	26.1%	20.5%
Very	17.8%	20.0%	15.7%
No opinion	2.5%	3.5%	1.6%
n=	242	115	127

Q10 Reasons for change in lamprey eating habits during last 3 years [Change of personal dietary habits]

	Total	Kurzeme	Riga + Pieriga	
Not at all	48.8%	50.4%	47.2%	
Slightly	12.4%	10.4%	14.2%	
Moderate	19.8%	15.7%	23.6%	
Fairly	12.4%	13.9%	11.0%	
Very	3.3%	5.2%	1.6%	
No opinion	3.3%	4.3%	2.4%	
n=	242	115	127	

Q10 Reasons for change in lamprey eating habits during last 3 years [Information about lampreys and cooking options in mass media and social networks]

	Total	Kurzeme	Riga + Pieriga	
Not at all	64.9%	61.7%	67.7%	
Slightly	9.5%	13.0%	6.3%	
Moderate	15.3%	13.9%	16.5%	
Fairly	3.7%	4.3%	3.1%	
Very	2.1%	2.6%	1.6%	
No opinion	4.5%	4.3%	4.7%	
n=	242	115	127	

Q11 Places to buy lampreys

	Total	Kurzeme	Riga + Pieriga	
from lamprey fishers	11.0%	13.2%	9.1%	
from processors	19.5%	15.7%	22.7%	
fair	15.0%	19.1%	11.6%	
specialised fish shpo	9.9%	9.8%	9.9%	
market	21.7%	23.5%	20.2%	
supermarket	17.9%	15.7%	19.8%	
restaurant	1.6%	0.5%	2.5%	
other options	3.4%	2.5%	4.1%	
n=	242	115	127	

Q12 Please evaluate what are your favorite lamprey products

	Total	Kurzeme	Riga + Pieriga	
smoked	10.1%	12.5%	7.8%	
grilled	5.1%	6.6%	3.5%	
fried	82.7%	77.9%	87.2%	
other	2.2%	2.9%	1.4%	
n=	242	115	127	

Q14 Consumption of the lamprey/lamprey products in your household

	Total	Kurzeme	Riga + Pieriga	
less than 1 lamprey per person	8.3%	9.6%	7.1%	
1 – 2 lampreys per person	41.7%	40.9%	42.5%	
more than 2 lampreys per person	50.0%	49.6%	50.4%	
n=	242	115	127	

Q15 Possible changes in consumption if lamprey product price would fall by 25%

	Total	Kurzeme	Riga + Pieriga	
will not change substantially	24.5%	24.0%	24.9%	
will increase slightly (less than 25%)	41.1%	36.2%	45.9%	
will increase by a fourth	25.2%	29.5%	21.0%	
will increase by more than 25%	9.2%	10.2%	8.2%	
n=	511	247	254	

Q16 Participation in lamprey-related entertainment or culture events [Eating of lamprey food in a restaurant]

	Total	Kurzeme	Riga + Pieriga	
I have participated	6.1%	3.9%	8.2%	
I often participate	0.4%	0.0%	0.8%	
I would be interested to participate	33.7%	36.2%	31.1%	
I'm not interested to participate	59.9%	59.8%	59.9%	
n=	511	247	254	

Q16 Participation in lamprey-related entertainment and/or culture events [Participation in a lamprey fishing]

	Total	Kurzeme	Riga + Pieriga	
I have participated	6.7%	4.7%	8.6%	
I often participate	0.4%	0.4%	0.4%	
I would be interested to participate	34.4%	35.8%	33.1%	
I'm not interested to participate	58.5%	59.1%	58.0%	
n=	511	247	254	

Q16 Participation in lamprey-related entertainment or culture events [Visit of lamprey-related tourism spots]

	Total	Kurzeme	Riga + Pieriga	
I have participated	10.6%	9.4%	11.7%	
I often participate	0.4%	0.0%	0.8%	
I would be interested to participate	46.2%	48.4%	44.0%	
I'm not interested to participate	42.9%	42.1%	43.6%	
n=	511	247	254	

Q16 Participation in lamprey-related entertainment or culture events [Visit of lamprey-related culture events]

	Total	Kurzeme	Riga + Pieriga	
I have participated	14.1%	11.8%	16.3%	
I often participate	1.6%	0.0%	3.1%	
I would be interested to participate	44.4%	48.4%	40.5%	
I'm not interested to participate	39.9%	39.8%	40.1%	
n=	511	247	254	

Q16 Participation in lamprey-related entertainment or culture events [Visit of a lamprey preparation masterclass]

	Total	Kurzeme	Riga + Pieriga	
I have participated	2.7%	2.0%	3.5%	
I often participate	0.6%	0.4%	0.8%	
I would be interested to participate	45.6%	48.4%	42.8%	
I'm not interested to participate	51.1%	49.2%	52.9%	
n=	511	247	254	

Q17 Significance of lost for nature, if the lamprey disappeared in the Baltic Sea

	Total	Kurzeme	Riga + Pieriga	
preservation of lamprey stocks is not important	17.8%	20.5%	15.2%	
conservation of lamprey stocks is important	56.0%	51.6%	60.3%	
conservation of lamprey stocks is essential	26.2%	28.0%	24.5%	
n=	511	247	254	

Q18 Gender

	Total	Kurzeme	Riga + Pieriga	
Male	47%			
Female	53%			
n=	511	247	254	

Q19 Age

	Total	Kurzeme	Riga + Pieriga
under 35	34%		
36-50	29%		
51-65	31%		
over 65	6%		
n=	511	247	254

Q20 Average household income person/ month

	Total	Kurzeme	Riga + Pieriga
up to 300 EUR	4.7%	5.1%	4.3%
301 – 700 EUR	17.8%	25.6%	10.1%
701 – 1200 EUR	38.4%	38.6%	38.1%
801 – 1200 EUR	30.3%	25.2%	35.4%
more than 1200 EUR	8.8%	5.5%	12.1%
n=	511	247	254

Residents' survey results in Klaipeda and Telsai County

Q1 Aspects important to welfare and life quality [Work opportunities close to home]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	3	3,8	3,8	3,8
	Slightly important	17	21,3	21,3	25,0
	Moderate	14	17,5	17,5	42,5
	Fairly important	12	15,0	15,0	57,5
	Very important	30	37,5	37,5	95,0
	No opinion	4	5,0	5,0	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Leisure opportunities close to home]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	13	16,3	16,3	16,3
	Slightly important	10	12,5	12,5	28,7
	Moderate	15	18,8	18,8	47,5
	Fairly important	25	31,3	31,3	78,8
	Very important	14	17,5	17,5	96,3
	No opinion	3	3,8	3,8	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Sense of community]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	7	8,8	8,8	8,8
	Slightly important	19	23,8	23,8	32,5
	Moderate	18	22,5	22,5	55,0
	Fairly important	16	20,0	20,0	75,0
	Very important	15	18,8	18,8	93,8
	No opinion	5	6,3	6,3	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Preserving of traditions]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	4	5,0	5,0	5,0
	Slightly important	14	17,5	17,5	22,5
	Moderate	13	16,3	16,3	38,8
	Fairly important	21	26,3	26,3	65,0
	Very important	26	32,5	32,5	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Availability of the local food]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	5	6,3	6,3	6,3
	Slightly important	9	11,3	11,3	17,5
	Moderate	11	13,8	13,8	31,3
	Fairly important	23	28,7	28,7	60,0
	Very important	30	37,5	37,5	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Nature's diversity]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	3	3,8	3,8	3,8
	Slightly important	8	10,0	10,0	13,8
	Moderate	5	6,3	6,3	20,0
	Fairly important	15	18,8	18,8	38,8
	Very important	47	58,8	58,8	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Cleanliness of surroundings]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	1	1,3	1,3	1,3
	Slightly important	9	11,3	11,3	12,5
	Fairly important	10	12,5	12,5	25,0
	Very important	58	72,5	72,5	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to welfare and life quality [Landscape visual quality]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	4	5,0	5,0	5,0
	Slightly important	7	8,8	8,8	13,8
	Moderate	2	2,5	2,5	16,3
	Fairly important	17	21,3	21,3	37,5
	Very important	48	60,0	60,0	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q1 Aspects important to life quality [Attractive environment for tourism, presence of tourism spots]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	7	8,8	8,8	8,8
	Slightly important	7	8,8	8,8	17,5
	Moderate	8	10,0	10,0	27,5
	Fairly important	18	22,5	22,5	50,0
	Very important	38	47,5	47,5	97,5
	No opinion	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	a protected species	26	32,5	32,5	32,5
	a symbol	4	5,0	5,0	37,5
	an aquatic animal sometimes taken for human consumption	32	40,0	40,0	77,5
	a delicacy	11	13,8	13,8	91,3
	unsavoury	1	1,3	1,3	92,5
	don't know what it is	6	7,5	7,5	100,0
	Total	80	100,0	100,0	

Q4 Lamprey eating traditions evaluation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	somebody in my family has lampreys in his/her diet	6	7,5	7,5	7,5
	somebody of my parents/grandparents has/had lampreys in his/her diet	16	20,0	20,0	27,5
	nobody in my family has lamprey in his/her diet	36	45,0	45,0	72,5
	Total	58			

nobody of my parents/grandparents has/had lampreys in his diet	19	23,8	23,8	96,3
no opinion	3	3,8	3,8	100,0
Total	80	100,0	100,0	

Q5 Ever eaten (tasted) lamprey or lamprey products

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes and I have them in my diet	3	3,8	3,8	3,8
yes, but I don't have them in my diet	39	48,8	48,8	52,5
no, but I would like to try them	25	31,3	31,3	83,8
no, I would not like to try them	13	16,3	16,3	100,0
Total	80	100,0	100,0	

Q6 Main reasonsto exclude lampreys from the diet

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid less than once per year	8	10,0	10,0	10,0
can't afford/too expensive	34	42,5	42,5	52,5
unappetizing look	4	5,0	5,0	57,5
unpalatable	14	17,5	17,5	75,0
because of ethical / moral reasons	5	6,3	6,3	81,3
other reasons (please mention)	4	5,0	5,0	86,3
Total	11	13,8	13,8	100,0
	80	100,0	100,0	

Q7 Frequency of lamprey consumption

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid never	72	90,0	90,0	90,0
once per year	1	1,3	1,3	91,3
1 - 3 times per year	2	2,5	2,5	93,8
Total	5	6,3	6,3	100,0
	80	100,0	100,0	

Q8 Aspects affecting lamprey eating habits [Price]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	72	90,0	90,0	90,0
Slightly	6	7,5	7,5	97,5
No opinion	1	1,3	1,3	98,8
Total	1	1,3	1,3	100,0
	80	100,0	100,0	

Q8 Aspects affecting lamprey eating habits [Access]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	72	90,0	90,0	90,0
Veryt	2	2,5	2,5	92,5
No opinion	5	6,3	6,3	98,8
Total	1	1,3	1,3	100,0
	80	100,0	100,0	

Q8 Aspects affecting lamprey eating habits [Necessity]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	72	90,0	90,0	90,0
Slightly	5	6,3	6,3	96,3
Fairly	1	1,3	1,3	97,5
No opinion	1	1,3	1,3	98,8
Total	1	1,3	1,3	100,0
	80	100,0	100,0	

Q8 Aspects affecting lamprey eating habits [Mood]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	7	8,8	8,8	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q8 Aspects affecting lamprey eating habits [Other]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	74	92,5	92,5	92,5
Not at all	4	5,0	5,0	97,5
Veryt	1	1,3	1,3	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q9 Change in lamprey eating habits during last 3 years

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
more often than previously	1	1,3	1,3	91,3
rarer than previously	4	5,0	5,0	96,3
the same like before	1	1,3	1,3	97,5
can't evaluate	2	2,5	2,5	100,0
Total	80	100,0	100,0	

Q10 Reasons for change in lamprey eating habits during last 3 years [Changes of lamprey price]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	7	8,8	8,8	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q10 Reasons for change in lamprey eating habits during last 3 years [Changes of personal welfare]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	7	8,8	8,8	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q10 Reasons for change in lamprey eating habits during last 3 years [Access of lampreys]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	3	3,8	3,8	93,8
Fairly	1	1,3	1,3	95,0
Veryt	3	3,8	3,8	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q10 Reasons for change in lamprey eating habits during last 3 years [Change of personal dietary habits]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	5	6,3	6,3	96,3
Slightly	1	1,3	1,3	97,5
Veryt	1	1,3	1,3	98,8
No opinion	1	1,3	1,3	100,0

Total	80	100,0	100,0	
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Q10 Reasons for change in lamprey eating habits during last 3 years [Information about lampreys and cooking options in mass media and social networks]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
Not at all	6	7,5	7,5	97,5
Slightly	1	1,3	1,3	98,8
No opinion	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q11 Places to buy lampreys

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	72	90,0	90,0	90,0
from lamprey fishers	4	5,0	5,0	95,0
in a market	1	1,3	1,3	96,3
other options	3	3,8	3,8	100,0
Total	80	100,0	100,0	

Q12 First choice lamprey products by producer

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	75	93,8	93,8	93,8
I only prepare myself	1	1,3	1,3	95,0
Not relevant	1	1,3	1,3	96,3
Self prepared	1	1,3	1,3	97,5
Smoked lampreys	1	1,3	1,3	98,8
There are no providers that would deliver to the shopping centres	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q13 Retail price in October 2019

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	38	47,5	47,5	47,5
up to 20 EUR/kg	5	6,3	6,3	53,8
20 - 25 EUR/kg	4	5,0	5,0	58,8
above 35 EUR/kg	1	1,3	1,3	60,0
no opinion/ did not buy	32	40,0	40,0	100,0
Total	80	100,0	100,0	

Q14 Consumption of the lamprey/lamprey products in your household

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	39	48,8	48,8	48,8
less than one lamprey per person	27	33,8	33,8	82,5
1 – 2 lampreys per person	10	12,5	12,5	95,0
more than two lampreys per person	4	5,0	5,0	100,0
Total	80	100,0	100,0	

Q15 Possible changes in consumption if lamprey product price would fall by 25%

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	39	48,8	48,8	48,8
will not change substantially	30	37,5	37,5	86,3

will increase slightly (less than a fourth)	8	10,0	10,0	96,3
will increase by a fourth	1	1,3	1,3	97,5
will increase by more than a fourth	2	2,5	2,5	100,0
Total	80	100,0	100,0	

Q16 Participation in lamprey-related entertainment or culture events [Eating of lamprey food in a restaurant]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11	13,8	13,8	13,8
I'm not interested to participate	14	17,5	17,5	31,3
I would be interested to participate	51	63,7	63,7	95,0
I have participated	4	5,0	5,0	100,0
Total	80	100,0	100,0	

Q16 Participation in lamprey-related entertainment and/or culture events [Participation in a lamprey fishing]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11	13,8	13,8	13,8
I'm not interested to participate	31	38,8	38,8	52,5
I would be interested to participate	31	38,8	38,8	91,3
I have participated	6	7,5	7,5	98,8
I often participate	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q16 Participation in lamprey-related entertainment or culture events [Visit of lamprey-related tourism spots]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11	13,8	13,8	13,8
I'm not interested to participate	23	28,7	28,7	42,5
I would be interested to participate	39	48,8	48,8	91,3
I have participated	6	7,5	7,5	98,8
I often participate	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q16 Participation in lamprey-related entertainment or culture events [Visit of lamprey-related culture events]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11	13,8	13,8	13,8
I'm not interested to participate	31	38,8	38,8	52,5
I would be interested to participate	36	45,0	45,0	97,5
I have participated	1	1,3	1,3	98,8
I often participate	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q16 Participation in lamprey-related entertainment or culture events [Visit of a lamprey preparation masterclass]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11	13,8	13,8	13,8
I'm not interested to participate	42	52,5	52,5	66,3
I would be interested to participate	26	32,5	32,5	98,8
I have participated	1	1,3	1,3	100,0
Total	80	100,0	100,0	

Q17 Significance of lost for nature, if the lamprey disappeared in the Baltic Sea

	Frequency	Percent	Valid Percent	Cumulative Percent
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Valid	preservation of lamprey stocks is not important	4	5,0	5,0	5,0
	conservation of lamprey stocks is important	39	48,8	48,8	53,8
	conservation of lamprey stocks is essential	20	25,0	25,0	78,8
	no opinion	17	21,3	21,3	100,0
	Total	80	100,0	100,0	

Q18 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	34	42,5	42,5	42,5
	Female	46	57,5	57,5	100,0
	Total	80	100,0	100,0	

Q19 Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	under 20	1	1,3	1,3	1,3
	20-35	38	47,5	47,5	48,8
	36-50	29	36,3	36,3	85,0
	51-65	10	12,5	12,5	97,5
	over 65	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q20 Municipality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Klaipėdos m. sav.	43	53,8	53,8	53,8
	Klaipėdos r. sav.	10	12,5	12,5	66,3
	Kretingos r. sav.	3	3,8	3,8	70,0
	Neringos sav.	8	10,0	10,0	80,0
	Palangos sav.	10	12,5	12,5	92,5
	Silutes r. sav.	3	3,8	3,8	96,3
	Skuodo r. sav.	1	1,3	1,3	97,5
	Telšių r. sav.	2	2,5	2,5	100,0
	Total	80	100,0	100,0	

Q21 Number of persons in a household

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	13,8	13,8	13,8
	2	24	30,0	30,0	43,8
	3	21	26,3	26,3	70,0
	4	16	20,0	20,0	90,0
	5	8	10,0	10,0	100,0
	Total	80	100,0	100,0	

Q22 Average household income person/ month

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	up to 200 EUR	1	1,3	1,3	1,3
	201 – 500 EUR	11	13,8	13,8	15,0
	501 – 800 EUR	26	32,5	32,5	47,5
	801 – 1200 EUR	20	25,0	25,0	72,5
	more than 1200 EUR	22	27,5	27,5	100,0
	Total	80	100,0	100,0	

Enterprises and institutions represented in interviews (Kurzeme region, Latvia):**Local fishermen and fishing companies:**

Zv/s "Kaijas", Pāvilostas novads
 SIA "Viga 3", Pāvilostas novads
 Zv/s "Uz viļņa", Pāvilostas novads
 Zv/s "Saka AA", Pāvilostas novads
 SIA "Santa VV", Pāvilostas novads
 IU "Merlin Liepāja", Pāvilostas novads
 Zv/s "Labrags", Ventspils novads
 SIA "Ventas nēģis", Ventspils novads
 SIA "BURA & Co", Ventspils novads
 Z/s "Meldi N", Ventspils novads
 Zv/s "Irbes", Ventspils novads
 SIA "Leču nēģis", Ventspils novads
 SIA "Pundiķi", Rojas novads
 Zv/s "Vilnis", Mērsraga novads
 Biedrība "Kurlande", Kuldīgas novads

Fish smokehouse:

Pāvilostas Zv/s "JEG", Pāvilostas novads
 Zv/s "Kaija", Pāvilostas novads
 IK "Gundegas IP", Carnikavas novads
 SIA "Tilaudi", Engures novads

Fish traders:

Zivju veikals Pāvilostā Zv/s "Kaijas", Pāvilostas novads
 Ragaciema Zivju tirgus, Engures novads
 Specializēts zivju veikals "Lielais loms", Siguldas novads

Restaurants:

Restorāns "Āķagals", Pāvilostā
 Zivju resotrāns "Zivju Lete", Rīgā
 Zivju resotrāns "Bermudas", Ragaciemā

Tourism organisations:

Carnikavas novadpētniecības centrs, Carnikavas novads
 Biedrība "Slow Food Straupe", Straupes novads
 Biedrība "Lauku ceļotājs", Rīga

Representatives from the local municipalities' in project area

Pāvilostas novada tūrisma informācijas centrs
 Ventspils tūrisma informācijas centrs
 Kuldīgas tūrisma informācijas centrs

Fishing coordinating organisations, ministries, inspection:

Latvijas Zvejnieku Federācija
 BIOR
 Valsts Vides dienesta Liepājas reģionālā pārvalde
 Valsts Vides dienesta Ventspils reģionālā pārvalde
 Zemkopības ministrija
 Vides un Reģionālās attīstības ministrija

Enterprises and institutions represented in interviews (Klaipeda and Telsiai counties, Lithuania):

Local fishermen and fishing companies:

G. Petrausko IĮ (Šventosios upė), Palangos
Valiuko valčių nuomos ir žvejybos įmonė (Palanga-Sventoji, Šventosios upė) Sventoji
J. Putriaus Personalinė Įmonė (Šventosios upė) Palanga
UAB "Būtingės žuvis" (Sventoji) Palanga
UAB "Pamarėnas" (Kuršių marios)
UAB "Logusta" (Kuršių marios)
Rokas Radzvilavičius (Nemunas)
UAB "Venteris" (Kuršių marios)

Fish smokehouse:

Šamo žuvys, Rusnė
Jurijaus Belokopytovo individuali veikla "Anitos žyvys" Rusnė
„INGOS rūkyklėlė", Rusnė
UAB "Taurys", Kretingos r.

Fish traders:

UAB „Šiaurės jūra", Klaipeda
MB „Portugalijos eksporto svajonės", Klaipeda
Šamo žuvys, Rusnė
„INGOS rūkyklėlė", Rusnė
UAB "Rusnės žuvis"

Restaurants:

Restoranas „Prie Peterso tilto" Rusnė
UAB „Palangos tauras", Žuvies restoranas „Žuvinė", PALANGA
Restoranas „OLDMAN", PALANGA
Restoranas „Dreverta"
Cafe „Kuršis", Neringa
Šturmų švyturys

Tourism organisations:

Klaipeda Tourism and Culture Information Center
Klaipeda district Tourism Information Centre
Nida Culture and Tourism Information Centre „Agila"
Palanga Tourism Information Center
Water tourism services provider „Marių laivai"

Fishing coordinating organisations, ministries, inspections:

Asociacija „Vidmarės"
Žuvininkystės įmonių asociacija „Lampetra"
Silutės gyvosios gamtos apsaugos inspekcija
Telšių aplinkos apsaugos inspekcija
Klaipėdos gyvosios gamtos apsaugos inspekcija
Žuvininkystės tarnyba
Ministry of Environment

Other administration bodies:

Salos etnokultūros ir informacijos centras
Pajūrio regioninio parko direkcija
Nemuno deltos regioninio parko direkcija
Salantai Regional Park
Varniai Regional Park

Social indicators of costal municipalities and municipalities with lamprey fishing areas in Kurzeme

Territory	Area, km ²	Population (average), pers			Density pers/ km ²	Population at working age (15-64), pers	Changes in demographic load
		2015	2018	2018/2015	2018	2018	2018/2015
Liepāja	68	70 878	69 063	2 6%	1 017	41 023	101%
Ventspils	58	36 089	34 616	4 1%	601	20 976	103%
Dundaga m	676	4 001	3 691	7 7%	6	2 301	101%
Grobiņa m	490	8 847	8 437	4 6%	17	5 089	102%
Kuldīga m	1 757	23 706	22 472	5 2%	13	14 173	100%
Mērsrags m	110	1 568	1 459	7 0%	13	904	97%
Nīca m	351	3 367	3 181	5 5%	9	1 985	97%
Pāvilosta m	515	2 680	2 554	4 7%	5	1 587	96%
Roja m	200	3 774	3 477	7 9%	18	2 202	103%
Rucava m	448	1 666	1 508	9 5%	3	924	100%
Talsi m	1 763	29 225	27 901	4 5%	16	17 405	102%
Ventspils m	2 458	11 573	10 993	5 0%	5	6 854	103%
Municipalities with lamprey fishing areas	5 040	43 301	40 955	5 4%	8	25 720	100%
Coastal rural municipalities	5 248	37 476	35 300	5 8%	7	39 251	100%

Source: CSB Latvia, 2019

Economically active enterprises of market sector in Kurzeme region according to the number of employees and main economic activity

Main economic activity (NACE Rev. 2)	Size group					TOTAL	Share
	0-9	10-19	20-49	50-249	250+		
TOTAL	19 113	541	383	160	18	20 215	100%
A Agriculture, Forestry and Fishing	5 295	76	38	14	-	5 423	27%
B Mining and quarrying	22	4	5	1	-	32	0%
C Manufacturing	1 088	87	114	70	5	1 364	7%
D Electricity, gas, steam and air conditioning supply	78	6	7	3	-	94	0%
E Water supply, sewerage, waste management and remediation activities	27	5	6	4	-	42	0%
F Construction	1 226	71	61	18	2	1 378	7%
G Wholesale and retail trade; repair of motor vehicles and motorcycles	2 119	96	49	7	4	2 275	11%
H Transportation and storage	666	67	33	19	6	791	4%
I Accommodation and food service activities	430	54	23	8	1	516	3%
J Information and communication	336	8	4	3	-	351	2%
K Financial and insurance activities	160	3	1	-	-	164	1%
L Real estate activities	1 249	16	11	6	-	1 282	6%
M Professional, scientific and technical activities	1 406	13	4	2	-	1 425	7%
N Administrative and support service activities	836	11	14	3	-	864	4%
O Public administration and defence; compulsory social security	5	-	-	-	-	5	0%
P Education	436	1	3	-	-	440	2%
Q Human health and social work activities	811	14	5	2	-	832	4%
R Arts, entertainment and recreation	600	3	2	-	-	605	3%
S Other service activities	2 306	6	3	-	-	2 315	11%
NSP Not specified	17	-	-	-	-	17	0%

Source: CSB Latvia, 2019