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EEE PARAMA LIETUVAI:
partnerystė vertybėms kurti ir išsaugoti

PRIORITY SUBSTANCES INVENTARIZATION AND MONITORING PROGRAMME OPTIMIZATION

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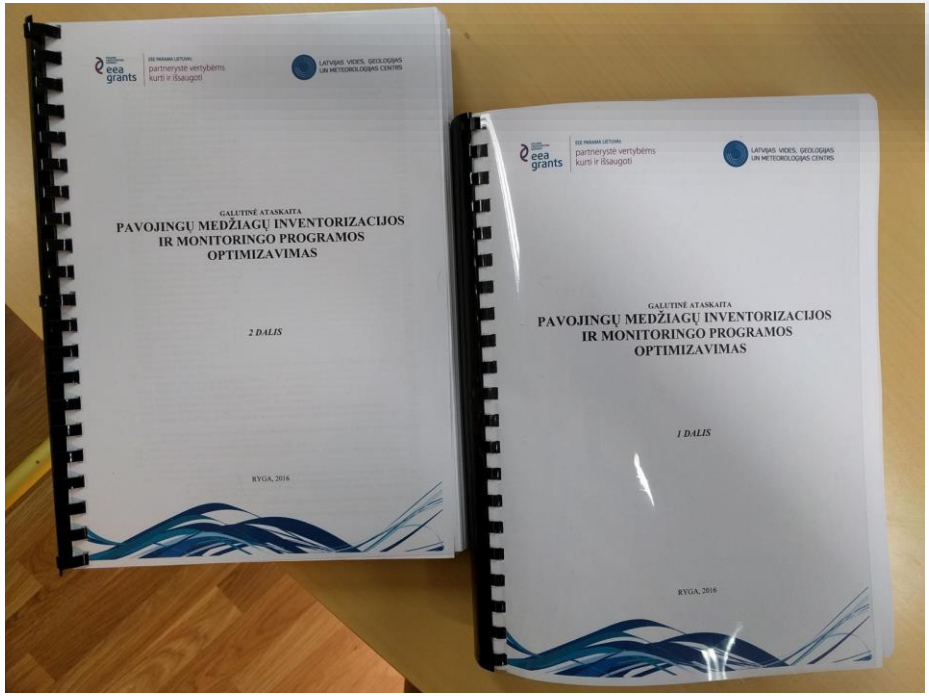
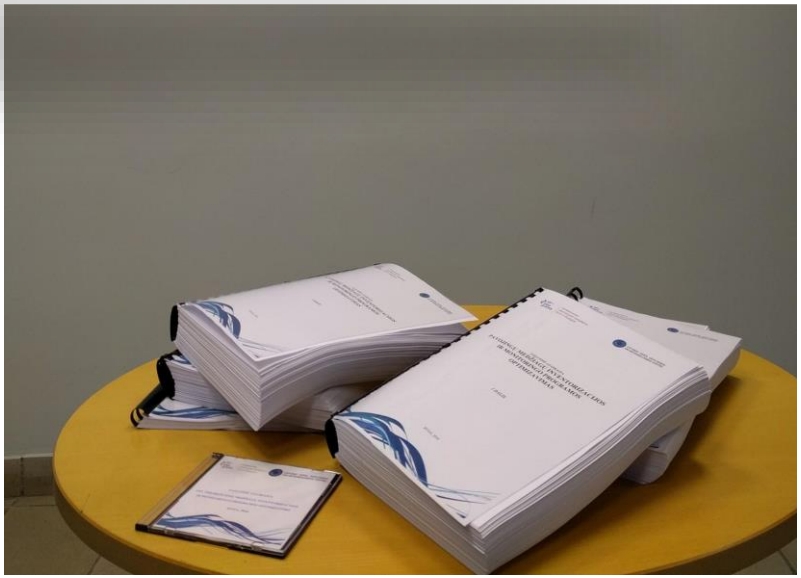




Main tasks

1. **Analysis of available environmental data**;
2. **Monitoring** of priority and hazardous substances **in water, bottom sediments** and **biota**, as well as in **wastewaters** and **wastewater sludge**;
3. **Assessment of** water **chemical quality**, taking into account long-term data and results from implemented projects, trend analysis and program of measures;
4. **Preparation of** optimized **monitoring program for priority and hazardous substances** for period 2016-2021.

Main activities

1. **Analysis of sources** of priority substances in surface waters and **inventarisation of amounts** of priority substances
2. Priority substances **monitoring** in surface waters, sediments, biota and wastewaters
3. **Analysis of sources** of priority pollutants in wastewaters
4. **Review** of priority substances in surface waters in period 2000-2015
5. **Monitoring programmes** of priority substances in surface waters

SOURCE ANALYSIS & INVENTARISATION

- Data analysis on point source data (waste water emissions)
- Data analysis on diffuse pollution (agriculture and atmosphere)
- Data analysis form Lithuanian data base about used, placed on market, imported and exported priority substances
- Summarized results from previous projects in all matrixes

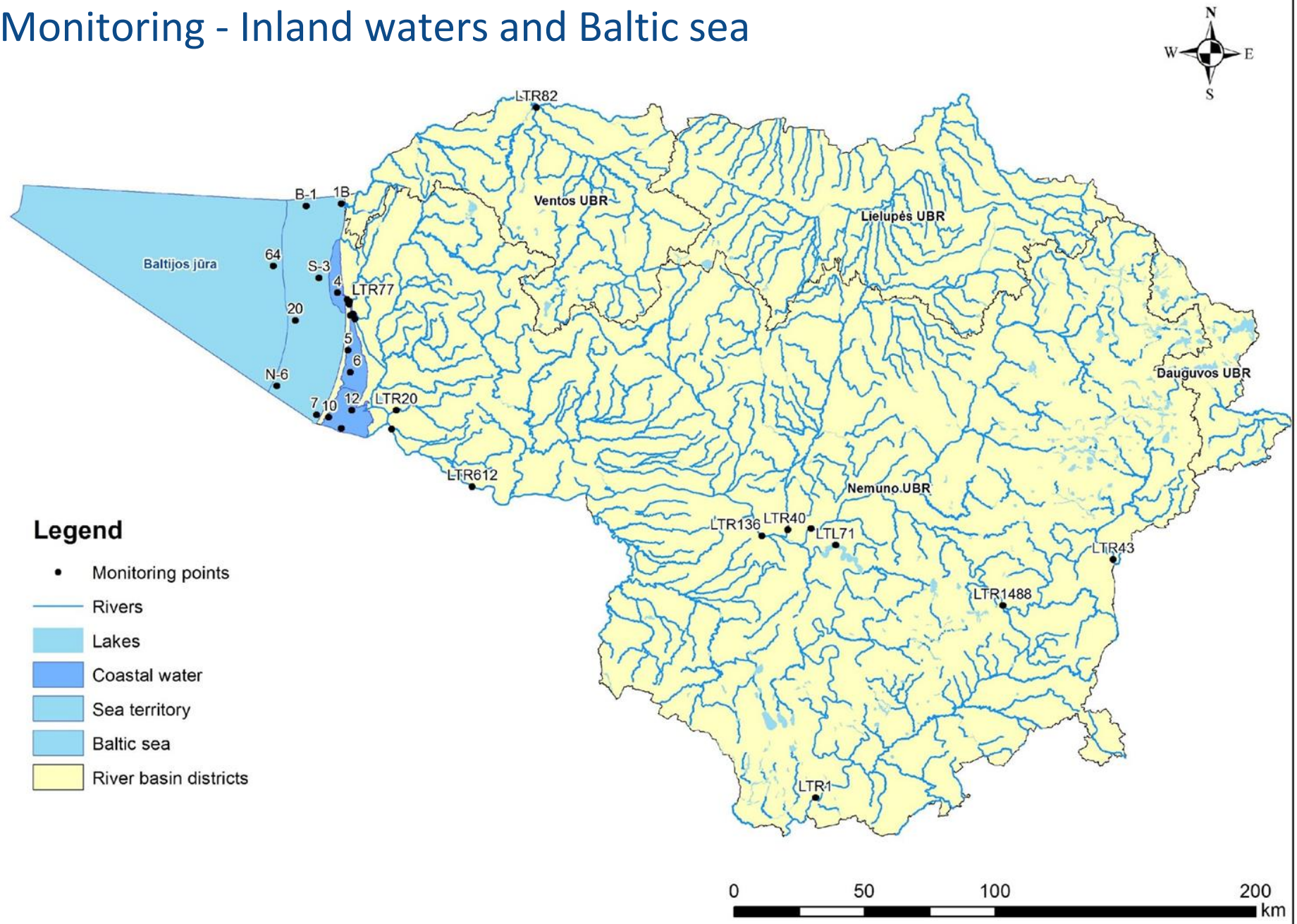
Initial identification of problematic priority substances

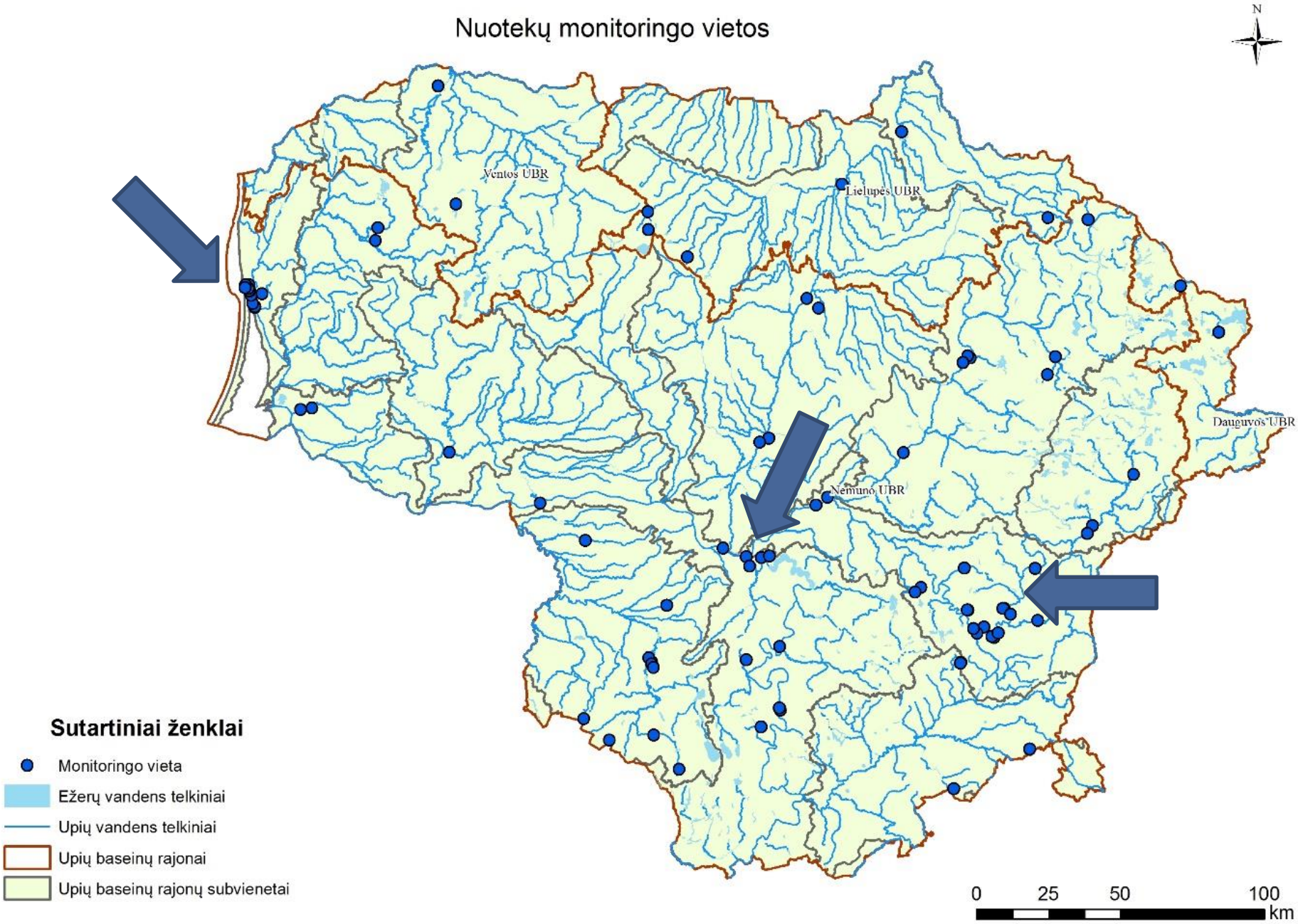
MONITORING

- Within current research all **45 priority substances** from EQS Directive 2013/39/EU were analyzed

- **Watch list monitoring** (EC decision 2015/495)

Monitoring - Inland waters and Baltic sea




Nuotekų monitoringo vietos
N
Ventos UBR
Lielupės UBR
Nemuno UBR
Dauguvos UBR
Sutartiniai ženklai
Monitoringo vieta
Ežerų vandens telkiniai
Upių vandens telkiniai
Upių baseinų rajonai
Upių baseinų rajonų subvienetai
0
25
50
100
km

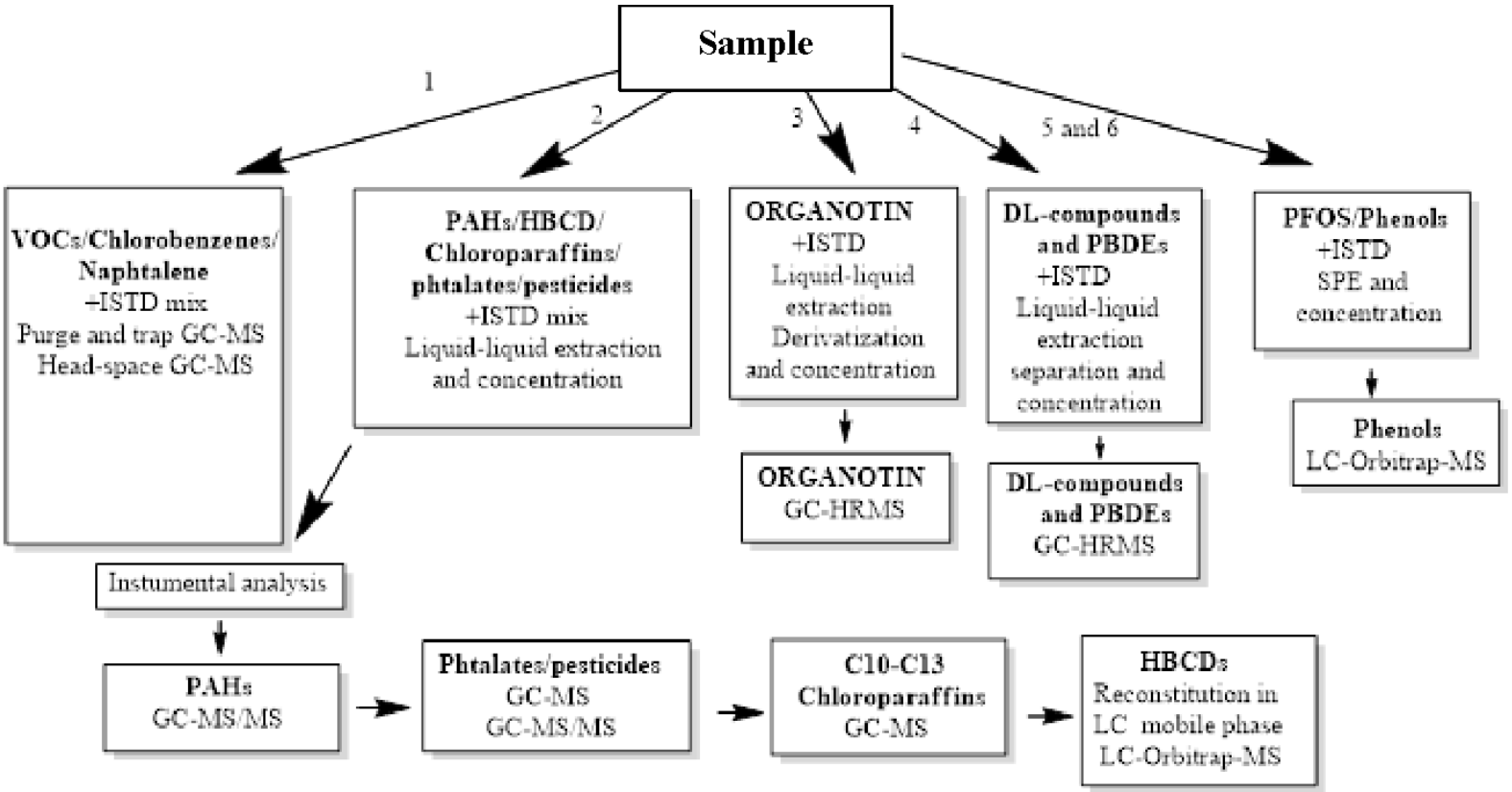
Problems occurred

- Waste water monitoring:
  - dry autumn in 2015, so in many cases, samples were missing;
  - technical issues in some industries.

  The missing samples were collected in the beginning of 2016 in other suitable places to cower amount of needed samples

- Inland waters and sea monitoring –
  - weather conditions in the end of 2015 – sea water samples could not be sampled – **samples collected March 2016**
  - Biota samples form inland waters **were sampled in 2016**

Analysis principial scheme



BIOR
INSTITUTE OF FOOD SAFETY, ANIMAL HEALTH AND ENVIRONMENT

Institute of Food Safety, Animal Health and Environment "BIOR"
Diagnostic Center
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fax: +37167620343
e-mail: partika@bior.gov.lv

LATAK - T- 012

TEST REPORT
№ PV-2016-P-17301.01

BIOR
INSTITUTE OF FOOD SAFETY, ANIMAL HEALTH AND ENVIRONMENT

Institute of Food Safety, Animal Health and

Lejupes Street 3, LV

TEST REPORT
№ PV-2016-P-17301.01

Customer: State limited Liability Company "Latvian Environment, Geology and Meteorology Centre"
Registration No.: 50103237791, address: Maskavas street 165, Riga, LV-1019, e-mail: lvgmc@lvgmc.lv,

The samples were received: "BIOR" Food and Environmental investigation laboratory, phone: 6761172
e-mail: partika@bior.lv, 07.03.2016 (testing order No: VP-2015-P-20259)

Type of order: Paid services. Food and environment.

Testing samples, results, methods and supplementary information

P-17301/1 - REGISTRATION NUMBER OF THE SAMPLE
Identification number given by client: B-1
Description and identification of the sample: surface water, samples amount: 1000 ml x 3 bottles
Supplementary information: no information
Information about sampling (according to the order for testing)
Person performed sampling: Liudmila Kondratjeva
Sampling plan and procedure: Baltijos jūros monitoringo 2015 m. planas, patvirtintas aplinkos ministro 20
Place of sampling: Baltijos jūra
Date, time of sampling: 02.03.2016

The samples were received: "BIOR" Food and environmental investigation laboratory (07.03.2016) Date (s) of beginning of tests: 08.03.2016
Date (s) of performance of tests: 25.07.2016

Group of substances	Substances	Method	The limit of quantification, µg/L[a]	Result, µg/L[b]
Polycyclic aromatic hydrocarbons (PAHs)	Naphthalene	BIOR-T-012-162-2015	0.1	< 0.1
	Anthracene		0.0025	<0.0025
	Fluoranthene		0.00189	<0.00189
	Benzo(b)fluoranthene		0.00005	<0.00005
	Benzo(k)fluoranthene		0.00005	<0.00005
	Benzo(a)pyrene		0.00005	<0.00005
	Indeno(1,2,3-cd)pyrene		0.00005	<0.00005
	Benzo(g,h,i)perylene		0.00005	<0.00005
Persistent organic pollutants (POPs)	Polybrominated diphenyl ethers (PBDEs) [m], [n]	BIOR-T-012-163-2015	0.0042	<0.0042
	Polychlorinated dibenzo-p-dioxins, dibenzofurans (PCDD/Fs) and dioxin-like polychlorinated biphenyls (DL-PCBs) [m], [o], [p]		0.150 pg PVO (2005)-PHDD/F-PFB-TEK	0.76 pg PVO (2005)-PHDD/F-PFB-TEK

Hexabromocyclododecane (HBCD)	α-HBCD	BIOR-T-012-162-2015	0.00008	<0.00008	13
	β-HBCD		0.00008	<0.00008	17
	γ-HBCD		0.00008	<0.00008	15
	Total-HBCD		0.00024	<0.00024	15
Chloroalkanes (C10-C13)	Chloroalkanes (C10-C13)	BIOR-T-012-162-2015	0.12	<0.12	20
Perfluorooctane sulfonic acid and its derivatives	PFOS	BIOR-T-012-165-2015	0.000039	0.0003	20
	PFOA		0.000039	0.0015	20
Phenols	Nonyphenol (4-nonylphenol)	BIOR-T-012-165-2015	0.09	0.189	25
	Octylphenol ((4-(1,1 ', 3,3'-tetrametilbutil) -phenol))		0.003	0.043	25
	Pentachlorophenol		0.003	<0.003	20
Tributyltin	Tributyltin cation	BIOR-T-012-164-2015	0.00006	<0.00006	15
Pesticides	Alachlor	BIOR-T-012-162-2015	0.09	< 0.09	50
	Atrazine		0.18	< 0.18	50
	Chlorfenvinphos		0.03	< 0.03	50
	Chlorpyrifos(chorpyrifos-ethyl)		0.009	< 0.009	50
	Aldrin		0.0015	< 0.0015	50
	Dieldrin		0.0015	< 0.0015	50
	Endrin		0.0015	< 0.0015	50
	Isodrin		0.0015	< 0.0015	50
	Total-DDT		0.003	<0.003	50
	p-p-DDT		0.003	<0.003	50
	Diuron		0.06	< 0.06	50
	Endosulfan [e]		0.0015	< 0.0015	50
	Hexachlorobenzene		0.015	< 0.015	50
	Hexachlorobutadiene		0.18	< 0.18	50
	Hexachlorocyclohexane [f]		0.0006	< 0.0006	50
	Isoproturon		0.09	< 0.09	50
	Pentachlorobenzene		0.00021	< 0.00021	50
	Simazine		0.3	< 0.3	50
	Trifluralin		0.009	< 0.009	50
	Dicofol		0.0000096	< 0.0000096	50
	Quinoxyfen		0.0045	< 0.0045	50
	Aclonifen		0.0036	< 0.0036	50
	Bifenox		0.00036	< 0.00036	50
	Cybutryne		0.00075	< 0.00075	50
	Total-cypermethrin		0.0000024	< 0.0000024	50
	Dihlorfoss		0.000018	< 0.000018	50
	Heptachlor and heptachlor epoxide		0.000000003	< 0.000000003	50
	Terbutryn		0.00195	< 0.00195	50

[a] – Results for all compounds, excluding PCDD/Fs, DL-PCBs and PBDEs are given in µg/L. For PCDD/Fs, DL-PCBs and PBDEs results are expressed in pg/L
[b] – Results are given as upperbound concentration
[c] – Detailed information of individual congener concentrations in the sample is provided in Annex I of the current report
[d] – Results are expressed as WHO_{2005}-PCDD/F-PCB-TEQ
[e] – Endosulfan is expressed as a sum of concentrations of endosulfan-alpha, endosulfan-beta and endosulfan sulfate. LOQs for individual compounds a
µg/L
[f] – Hexachlorocyclohexane is expressed as a sum of concentrations of HCH-alpha, HCH-beta and HCH gamma. LOQs for individual compounds are 0.000
[g] – Result is expressed as a sum of concentrations of heptachlor and heptachlor epoxide. LOQs for individual compounds are 0.0000000015 µg/L

Date of issuing of test report: 27.07.2016

Compiled by: Guntis Cepurnieks (head of elemental analysis department)
(name, surname, position)
Signed in the form of a secure electronic signature by Guntis Cepurnieks
(name, surname, position)

ANNEX I OF THE TEST REPORT
№ PV-2016-P-17301.01

Concentrations of individual congeners of PCDD/F, DL-PCB and PBDE in the tested sample

PCDD/F	
Congener	pg/L
2,3,7,8-TCDF	<0.14
1,2,3,7,8-PeCDF	<0.14
2,3,4,7,8-PeCDF	<0.15
1,2,3,4,7,8-HxCDF	<0.13
1,2,3,6,7,8-HxCDF	<0.11
2,3,4,6,7,8-HxCDF	<0.13
1,2,3,7,8,9-HxCDF	<0.14
1,2,3,4,6,7,8-HpCDF	<0.16
1,2,3,4,7,8,9-HpCDF	<0.25
OCDF	<0.49
2,3,7,8-TCDD	<0.23
1,2,3,7,8-PeCDD	<0.24
1,2,3,4,7,8-HxCDD	<0.21
1,2,3,6,7,8-HxCDD	<0.21
1,2,3,7,8,9-HxCDD	<0.20
1,2,3,4,6,7,8-HpCDD	<0.25
OCDD	<0.44
WHO(2005)-PCDD/F-TEQ lowerbound	ND
WHO(2005)-PCDD/F-TEQ upperbound	0.645
DL-PCBs	
Congener	pg/L
2',3,4,4',5-PentaHB (#123)	1.3
2,3',4,4',5-PentaHB (#118)	20.4
2,3,4,4',5-PentaHB (#114)	1.3
2,3,3',4,4'-PentaHB (#105)	1.69
2,3',4,4',5,5'-HexaHB (#167)	<0.38
2,3,3',4,4',5-HexaHB (#156)	<0.44
2,3,3',4,4',5'-HexaHB (#157)	<0.44
2,3,3',4,4',5,5'-HeptaHB (#189)	<0.38
3,4,4',5-TetraHB (#81)	<0.75
3,3,'4,4'-TetraHB (#77)	<0.81
3,3',4,4',5-PentaHB (#126)	<0.94
3,3',4,4',5,5'-HexaHB (#169)	<0.81
WHO(2005)-PCB-TEQ lowerbound	0.001
WHO(2005)-PCB-TEQ upperbound	0.119
WHO(2005)-PCDD/F-PCB-TEQ lowerbound	0.001
WHO(2005)-PCDD/F-PCB-TEQ upperbound	0.764
PBDEs	
Congener	pg/L
2,4,4'-TriBDE (#28)	<4.56
2,2',4,4'-TetraBDE (#47)	<4.44
2,2',4,4',5-PentaBDE (#99)	<5.56
2,2',4,4',6-PentaBDE (#100)	<5.06
2,2',4,4',5,5'-HexaBDE (#153)	<4.00
2,2',4,4',5,6'-HexaBDE (#154)	<3.31
ΣPBDE upperbound	26.9
ΣPBDE lowerbound	ND

< : Concentration below the identified limit of quantification (LOQ)

Lowerbound : Value calculated by including the quantified congeners only

Upperbound : Value calculated by including the non-quantified congeners by taking the full value of their LOQ

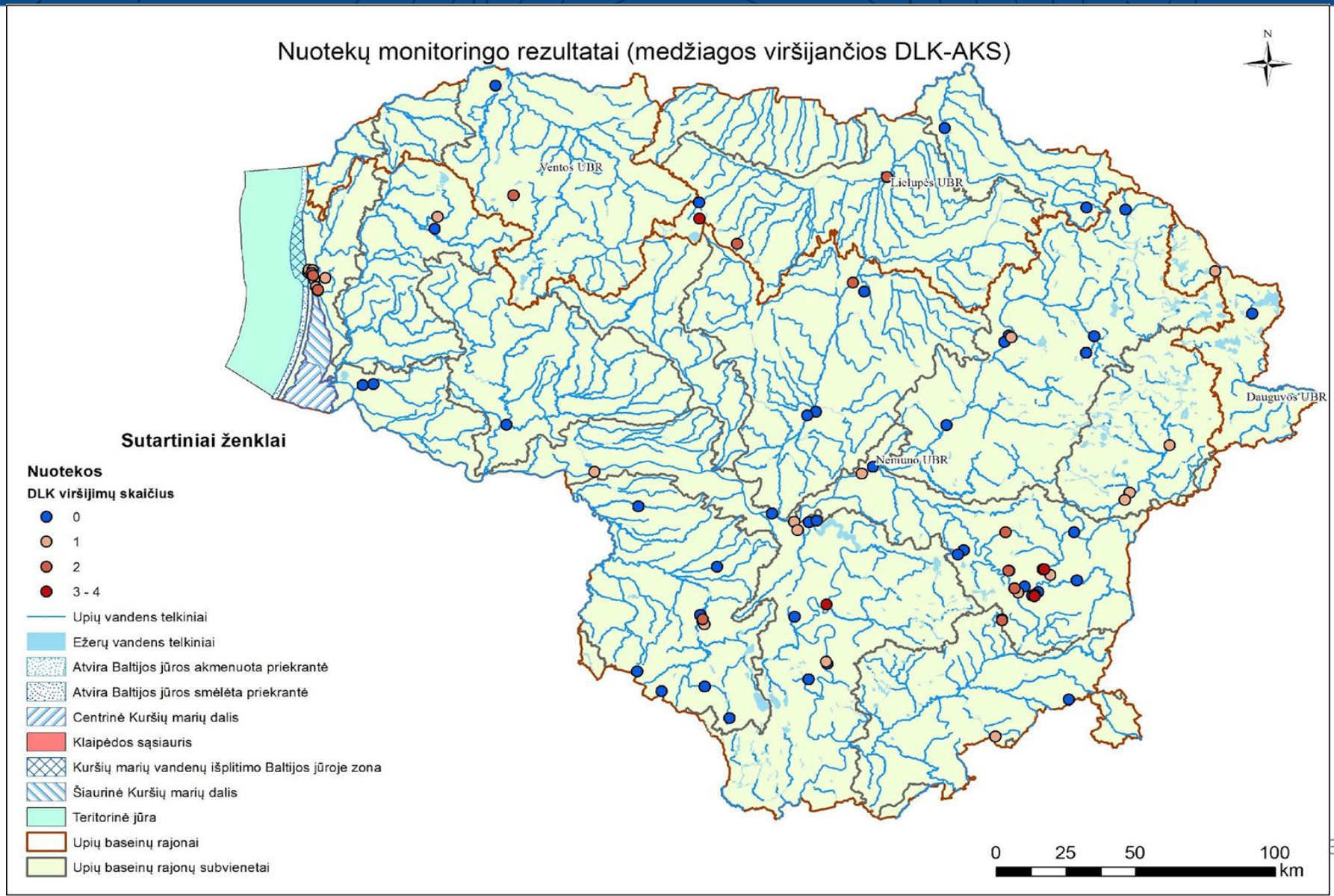
ND : Not determined since none of the corresponding congeners was above the LOQ

Some numbers...

Aplinkos terpė	Mėginių skaičius
Baltijos jūroje	
Vanduo	45
Dugno nuosėdos	16
Biota	16
Kuršių mariose	
Vanduo	36
Dugno nuosėdos	12
Biota	3
Upėse ir Kauno mariose	
Vanduo	94
Dugno nuosėdos	24
Biota	12
Stebėsenos sąrašo medžiagos	
Vanduo	12
Ūkio subjektų poveikio	
Nuotekos	163
Nuotekų dumblas	28
Paviršinso vanduo	87
Dugno nuosėdos	48
Iš viso	**592**

49 130 rezultatai

WASTEWATER QUALITY



Limitations during screening of priority substances

- **Lack of AA and MAC EQS limit values** for all pollutants, especially for such matrixes as sewage sludge and sediments;
- Lack of clear AA and MAC EQS limit values resulted in **potential misestimations**, thus making some pollutants (i.e. PFOS and Dioxins) seeming to be found in high concentrations everywhere;
- For industries, represented with only one enterprise, it was **impossible to identify «typical pollutants»**;
- There were couple of precedents, when economic activity classification (NACE Rev. 2) for certain enterprise was confusing and did not correctly represent its polluting activity (i.e., «real estate activity» – NACE Rev. 2 code 68).

Priority substances, typical for waste water of certain industries (I)

Industry (by NACE Rev. 2 classification)	Priority substances
11 – Manufacture of beverages	9b – DDT; 15 – Fluoranthene; 24 – Nonylphenols; 28 – PAH; 37 – Dioxins
13 – Manufacture of textiles	**6 – Cd**; **9b – DDT**; 12 – DEHP; **15 – Fluoranthene**; 20 – Pb; **24 – Nonylphenols**; **25 – Octylphenols**; **28 – PAH**; **30 – Tributyltin cation**; 35 – PFOS; **37 – Dioxins**
17 – Manufacture of paper and paper products	**6 – Cd**; **15 – Fluoranthene**; 23 – Ni; 28 – PAH; 35 – PFOS; **37 – Dioxins**
20 – Manufacture of chemicals and chemical products	**12 – DEHP**; 15 – Fluoranthene; **28 – PAH**; **35 – PFOS**; **37 – Dioxins**
22 – Manufacture of rubber and plastic products	6 – Cd; 15 – Fluoranthene; 20 – Pb; 23 – Ni; **24 – Nonylphenols**; **25 – Octylphenols**; 28 – PAH; **35 – PFOS**; **37 – Dioxins**
23 – Manufacture of other non-metallic mineral products	6 – Cd; **12 – DEHP**; 15 – Fluoranthene; **24 – Nonylphenols**; 28 – PAH; 35 – PFOS; 37 – Dioxins

Priority substances, typical for waste water of certain industries (II)

Industry (by NACE Rev. 2 classification)	Priority substances
28 – Manufacture of machinery and equipment	**15 – Fluoranthene**; 35 – PFOS; 37 – Dioxins
33.15 – Repair and maintenance of ships and boats	6 – Cd; 9b – DDT; 15 – Fluoranthene; 20 – Pb; 28 – PAH; **30 – Tributyltin cation**; 35 – PFOS; 37 – Dioxins
35 – Electricity, gas, steam and air conditioning supply	6 – Cd; **9b – DDT**; 15 – Fluoranthene; **20 – Pb**; 23 – Ni; **24 – Nonylphenols**; **28 – PAH**; 30 – Tributyltin cation; 35 – PFOS; **37 – Dioxins**
36 – Water collection, treatment and supply 37 – Sewerage	6 – Cd; **9b – DDT**; 11 – Dichloromethane; **12 – DEHP**; **15 – Fluoranthene**; 20 – Pb; **21 – Hg**; 23 – Ni; **24 – Nonylphenols**; **25 – Octylphenols**; **28 – PAH**; **30 – Tributyltin cation**; **35 – PFOS**; **37 – Dioxins**; **43 – HBCDD**

Priority substances, typical for waste water of certain industries (III)

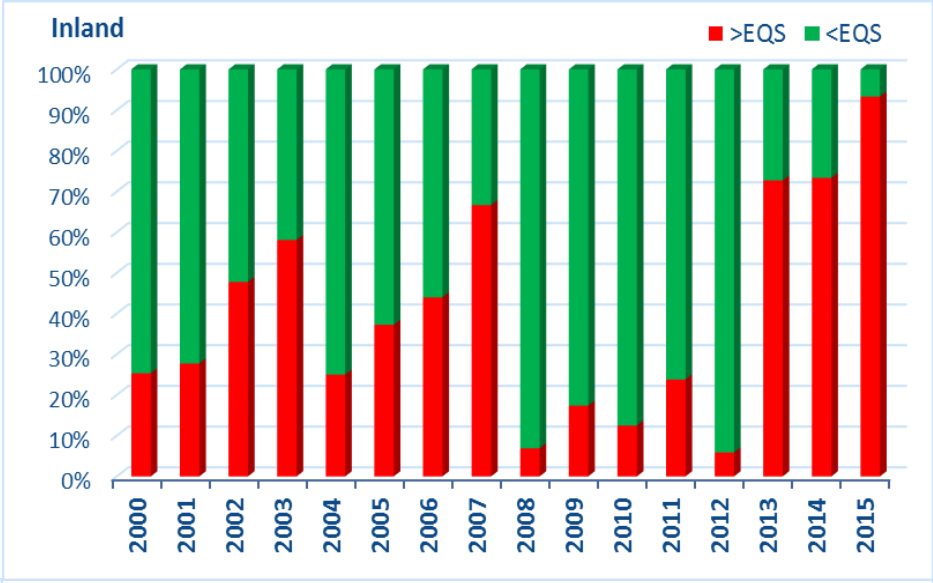
Industry (by NACE Rev. 2 classification)	Priority substances
49 – Land transport and transport via pipelines	15 – Fluoranthene; 24 – Nonylphenols; 25 – Octylphenols; 28 – PAH; 35 – PFOS; 37 – Dioxins
52 – Warehousing and and support activities for transportation (i.e. cargo handling in ports)	9b – DDT; 15 – Fluoranthene; 23 – Ni; 24 – Nonylphenols; 25 – Octylphenols; 28 – PAH; 35 – PFOS; 37 – Dioxins
68 – Real estate activities (controversial)	**15 – Fluoranthene**; 28 – PAH; 35 – PFOS; 37 – Dioxins

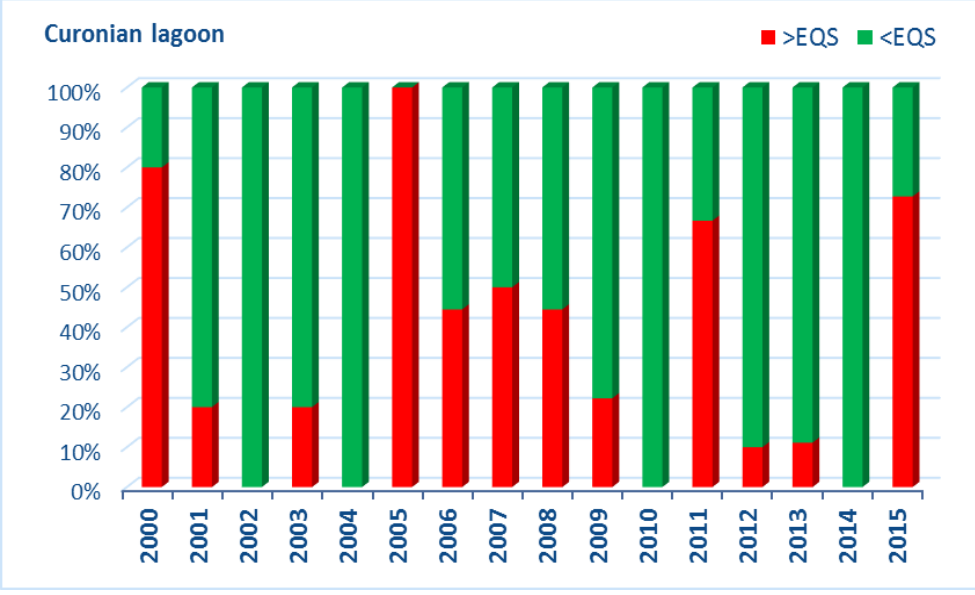
WATER CHEMICAL QUALITY

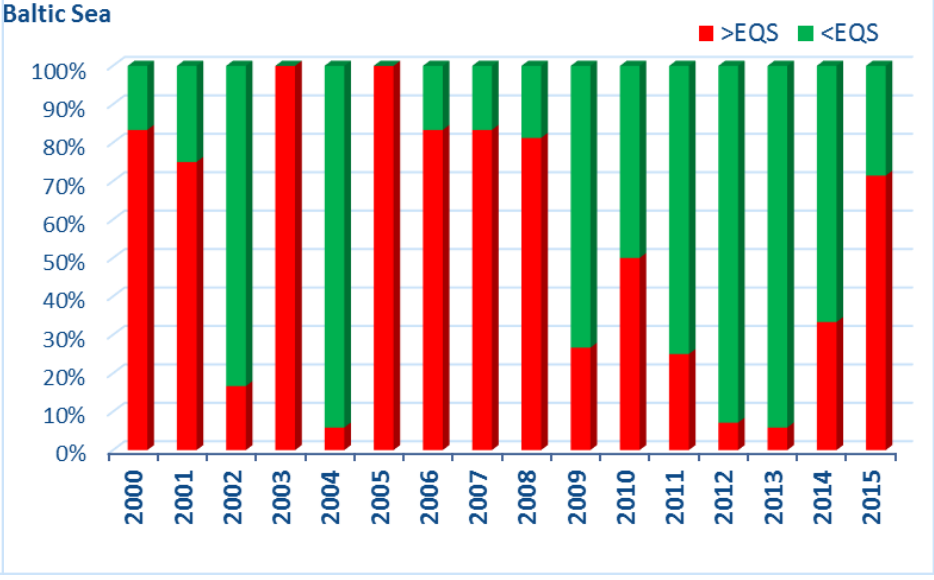
- Monitoring and project results during last 15 years (2000-2015) were evaluated in inland waters, Curonian lagoon and Baltic Sea. Older data were not included into analysis.
- Data analysis was done by monitoring stations and by matrices (water, sediments and biota).
- Trend analysis for each substance was done if concentrations were above LOQ for at least three year period.

EQS exceedances 2000-2015

- EQS (AA or MAC) exceedances for at least one substance were observed for most of studied years







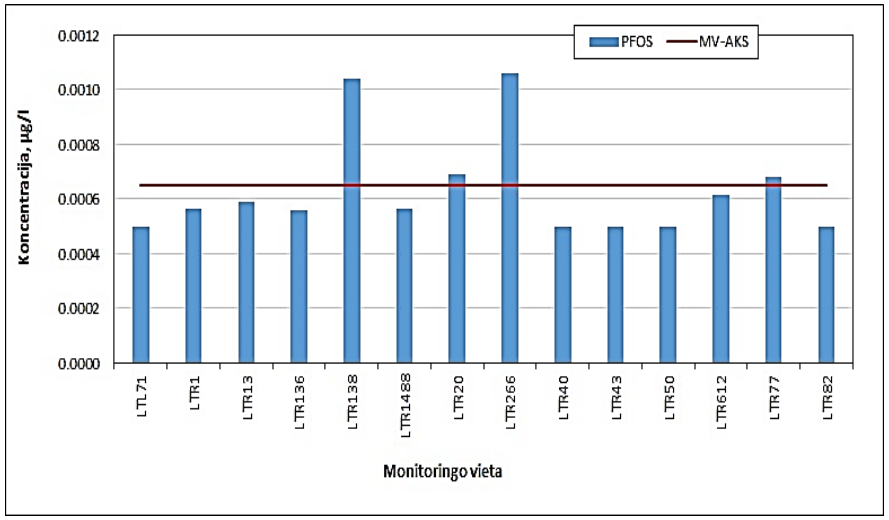
Priority substance monitoring in 2015 (rivers and lakes)

- Surface water monitoring in 2015 was done in following river stations: LTR1, LTR13, LTR136, LTR138*, LTR1488, LTR127*, LTR20, LTR266*, LTR40, LTR43, LTR50, LTR612, LTR77, LTR82, and in one lake station: LTL71 (Kauno marios).

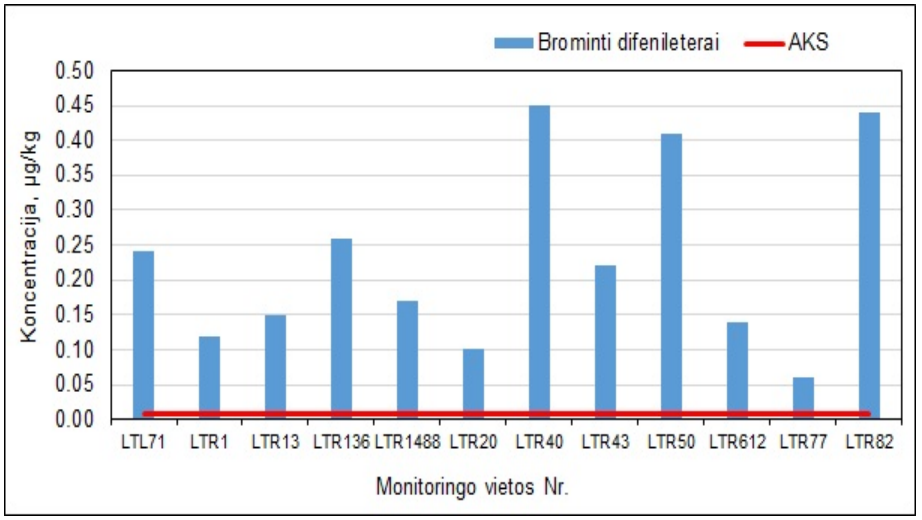
  *Samples were analyzed only in Lithuania

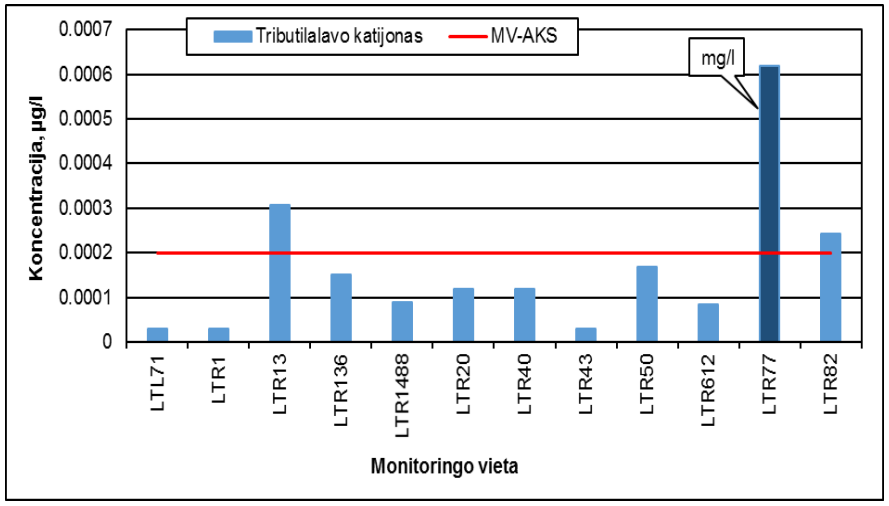
- AA-EQS exceedances in surface water were found for several substances: Pb, Ni, PFOS, cybutrine, DEHP, benzo(b)fluoranthene, tributyltin.
- MAC-EQS exceedances were observed for: Pb, Hg, cybutrine, benzo(g,h,i)perylene, tributyltin.
- BDE exceeded biota EQS in all samples and was in range from 0,06 µg/kg (LTR77) to 0,45 µg/kg(LTR40). Hg exceeded biota EQS from 1,2 to 5,7 times in all surveyed monitoring stations, except LTR40, LTR43 and LTR50.

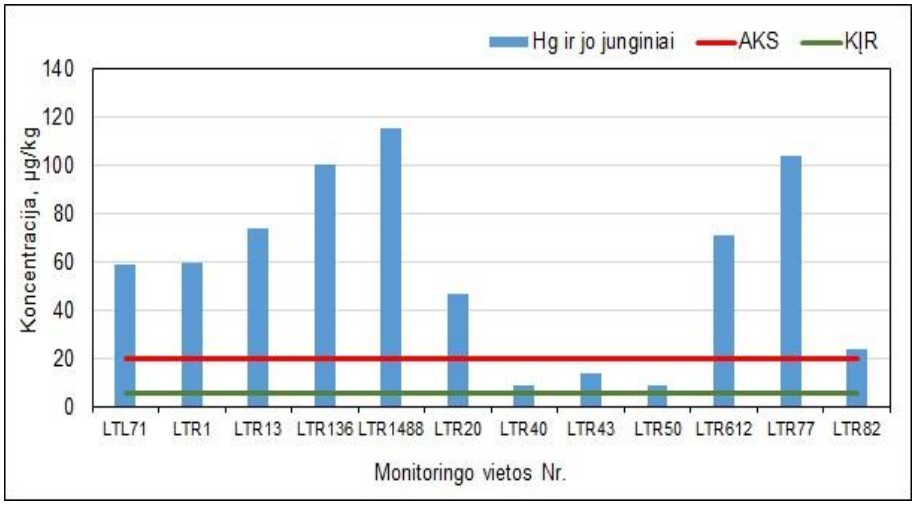
Surface water



Biota



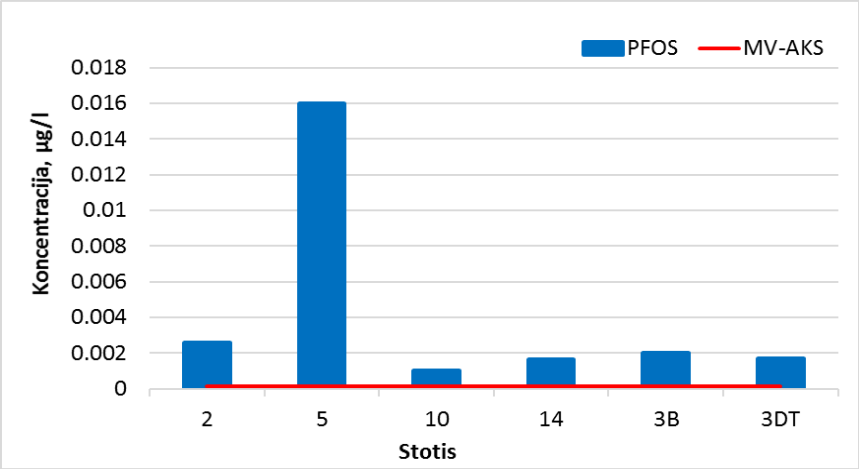


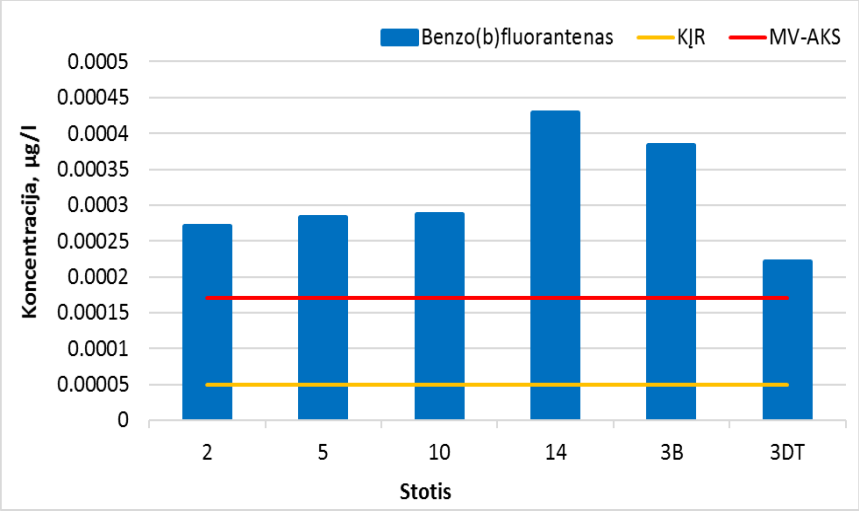


Priority substance monitoring in 2015 (Curonian lagoon)

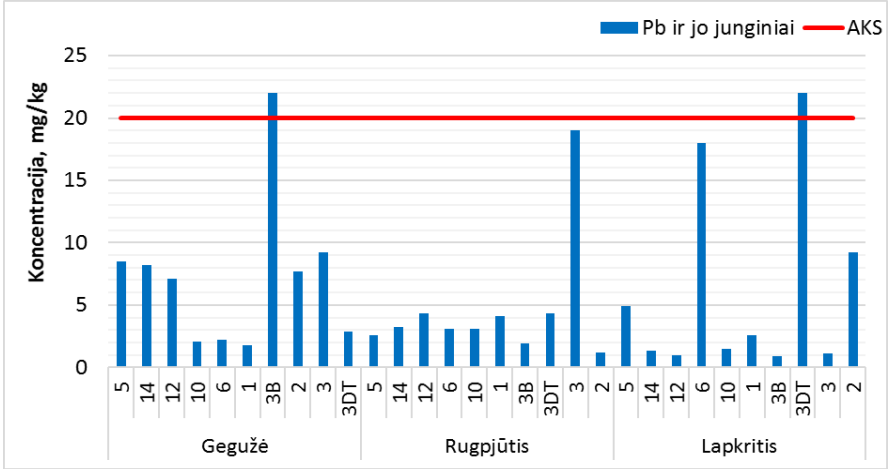
- Surface water monitoring in 2015 was done in fallowing stations: Nr 1, 2, 3, 5, 6, 10, 12, 14, 3A, 3B, 3DT.
- **AA-EQS** exceedances in surface water were observed for several substances: PFOS, total DDT, DEHP, all PAHs (Nr 28). MAC-EQS was not exceeded for any substance.
- Analysis of EQS exceedances in sediments was possible only for heavy metals (Cd, Pb, Hg, Ni) because these substances have national EQS standards. Cd EQS were exceeded in monitoring stations Nr 3, 3DT and 6. Pb in stations Nr 3, 3B, 3DT and 6. Hg in stations Nr 2, 3B, 3DT, 6. Ni in stations Nr 2, 3, 3B, 5, 6, 12 and 14.
- Priority substances in biota were monitored in monitoring stations Nr 2 and Nr 12. EQS exceedances were observed for BDE (monitoring stations Nr 2 and 12) and Hg (monitoring station Nr 2).

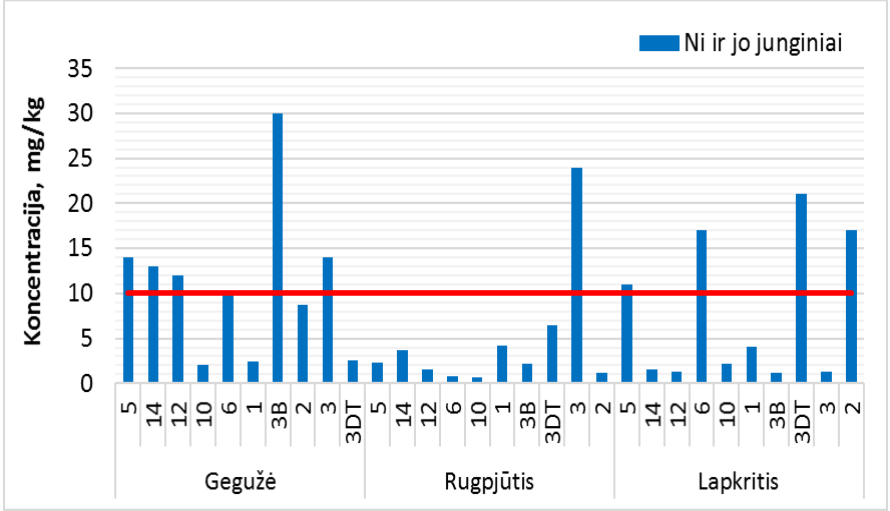
Surface water





Sediments

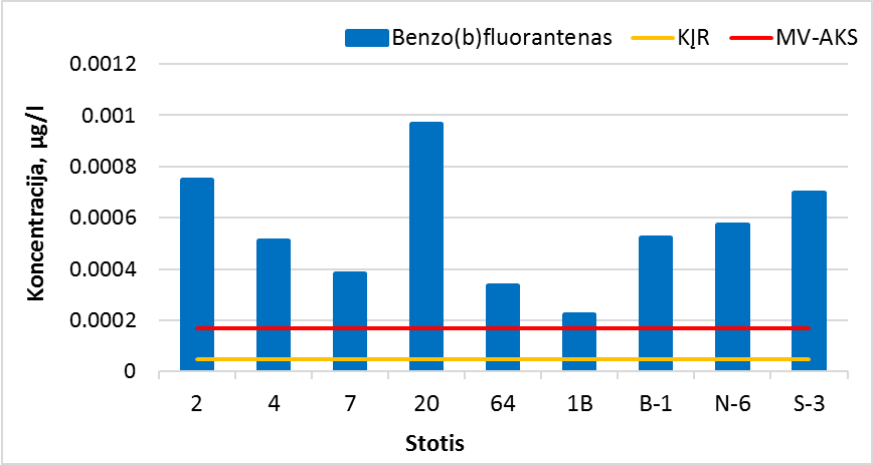


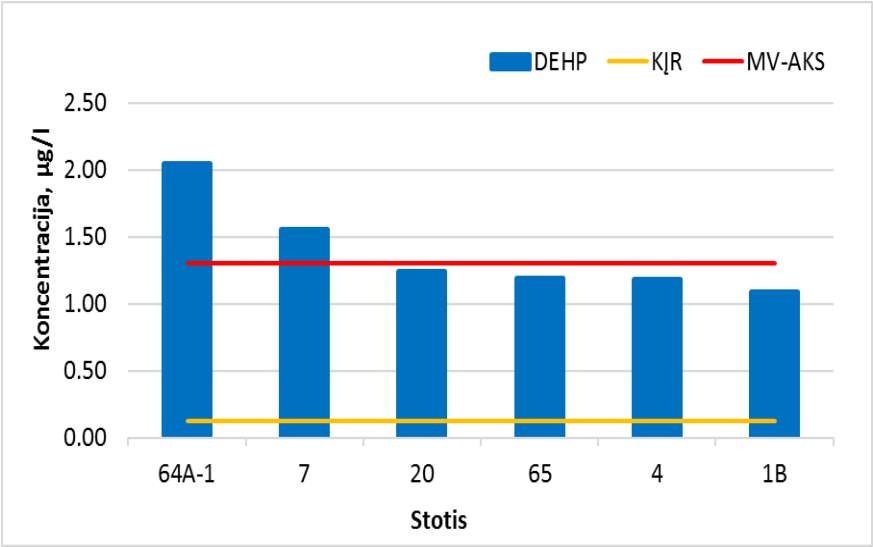


Priority substance monitoring in 2015 (Baltic Sea)

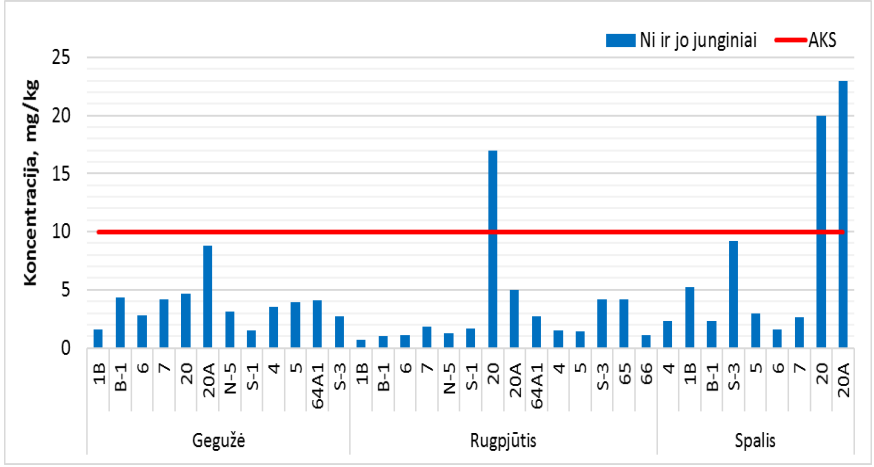
- Surface water monitoring in 2015 was done in fallowing stations: 1, 2, 4, 6, 7, 20, 64, 65, 1B, 64A1, B-1, N-6, S-1 and S-3.
- **AA-EQS** exceedances in surface water was observed for several substances: PFOS, DEHP, all PAHs. **MAC-EQS** was exceeded only for benzo(g,h,i)perylene.
- Analysis of EQS exceedances in sediments were possible only for heavy metals (Cd, Pb, Hg, Ni) because these substances have national EQS standards. EQS exceedances in sediments were observed only for Ni in stations Nr 20 ad 20A.
- Biota in Baltic Sea was monitored in several monitoring stations: Nr 2, 7, 1B, 20, 65, 506, 473. BDE exceeded EQS in all surveyed monitored stations. Hg-in all stations except Nr 65 and 473.
- Compared to the Curonian lagoon, concentrations of priority substances in the Baltic Sea are lower.

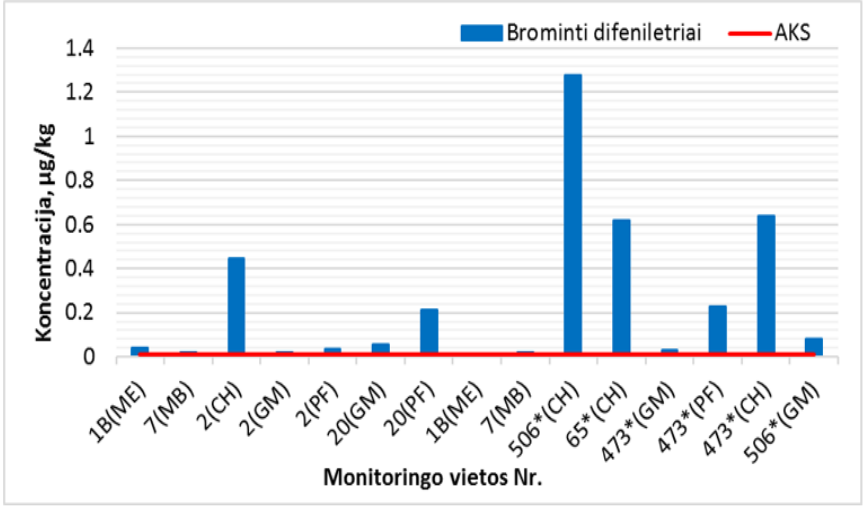
Surface water





Sediments/ biota





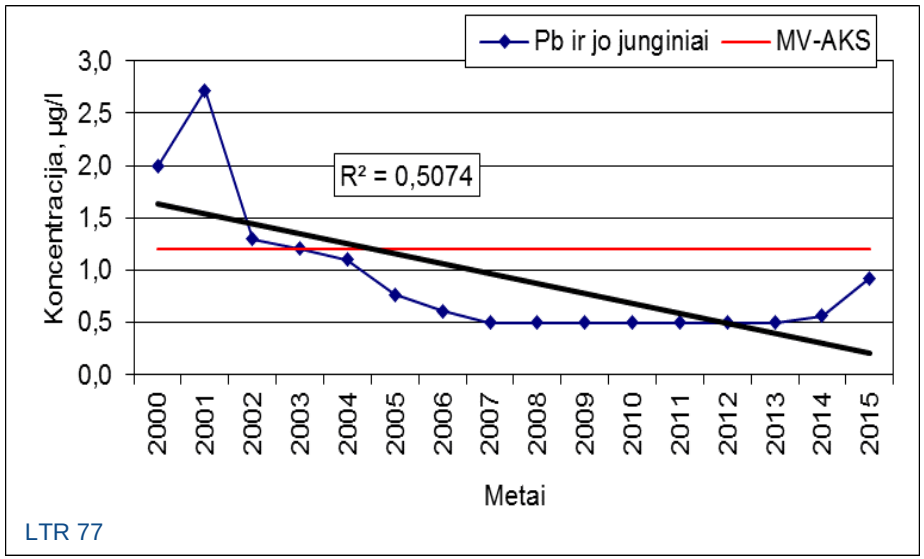
Paveikslas 4.1.3.14. **Brominti difenileteriai (medžiaga Nr. 5) biotoje (CH-*Clupea harengus*, GM-*Gadus morhua*, MB-*Macoma balthica*, ME-*Mytilus edulis*, PF-*Platichthys flesus*)**

Long-term trends

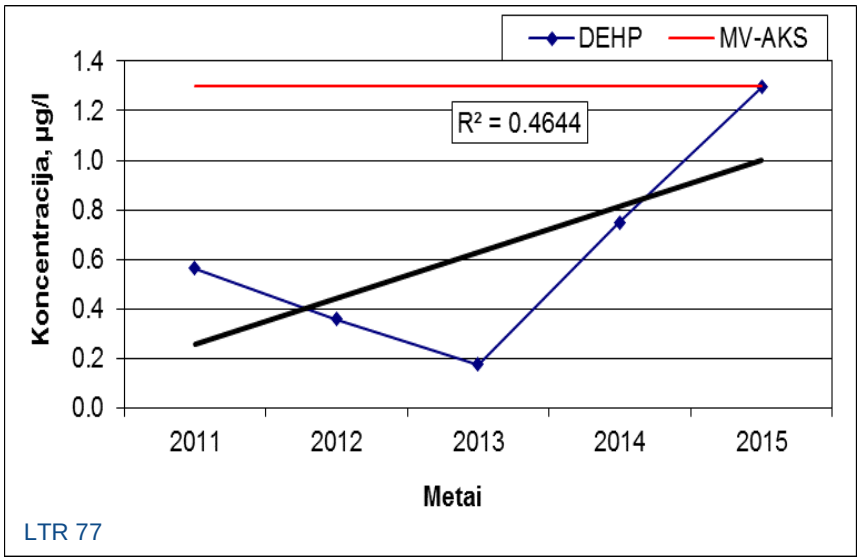
- Inland waters. Overall increasing trends in surface water were observed for substances Nr. 12 and 28, and in sediments for substances Nr. 15 and 28. In total, there is tendency that priority substance concentrations in surface water tend to decrease, but increasing trend can be found for concentrations in sediments.
- Curonian lagoon. Most of substances show strong decreasing trends. Exception is substance Nr. 22 (sediments). Concentrations of heavy metals in sediments and surface water have decreased significantly, especially Hg. In sediments increasing trends for at least one monitoring station were observed for eight substances. Increasing tendency was observed not only for Klaipeda harbor area, but also for several stations belonging to central part of lagoon (stations Nr. 6, 10, 12, 14).
- Baltic Sea. Heavy metal concentrations significant decreasing trend. More than one increasing trend was observed for substances Nr. 12 (surface water) and 15 (sediments). Most of increasing trends were observed for monitoring stations Nr. 20 and 64A1. Heavy metal concentration in sediments show decreasing trends (the only exceptions are Cd and Ni concentrations in monitoring stations Nr. 64A1 and S-3).

- It was not possible to make trend analysis for **PFOS** because monitoring of this substance started only recently. But relatively large number of EQS exceedances indicates that for PFOS additional attention must be in future.

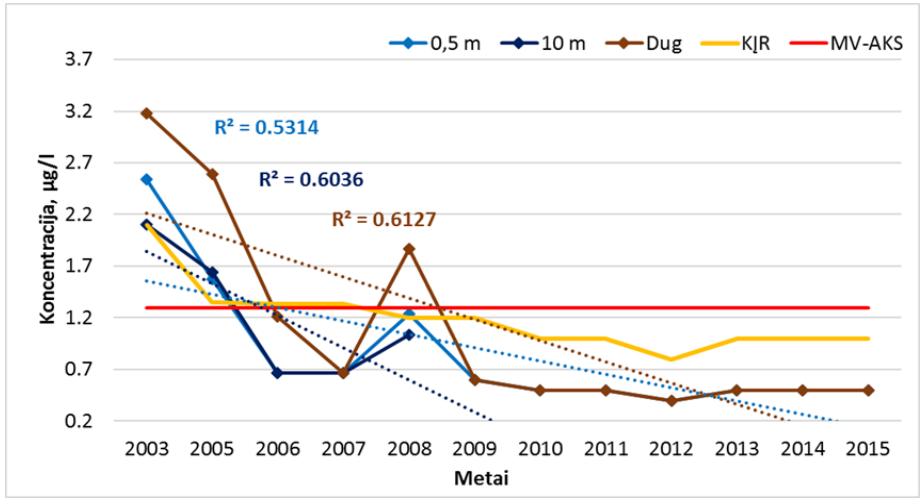
Trends in surface water



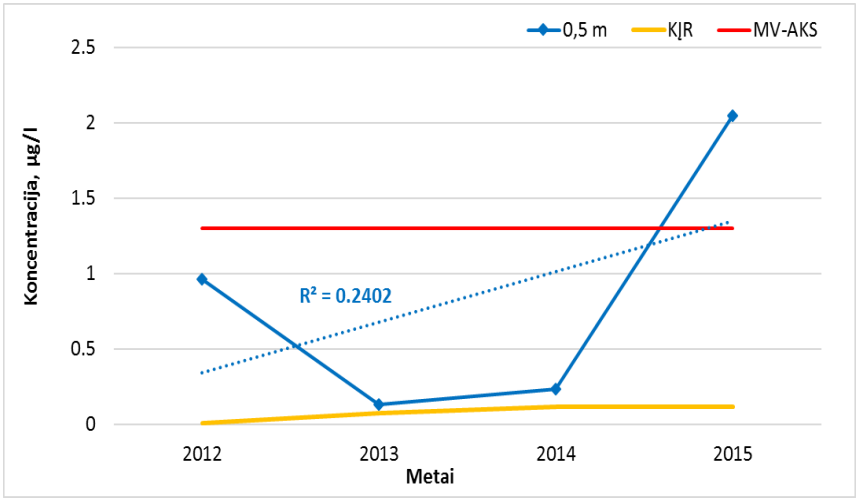
LTR 77



LTR 77

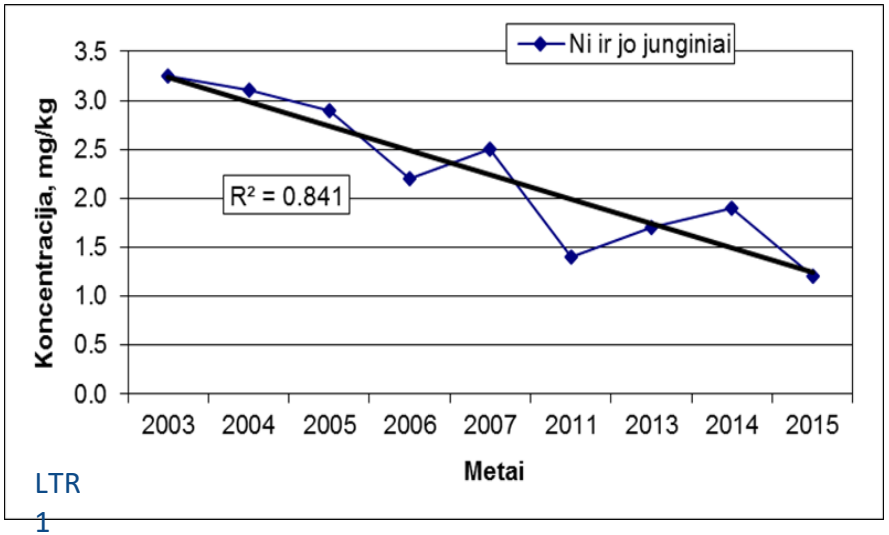


Baltic Sea- Nr 20

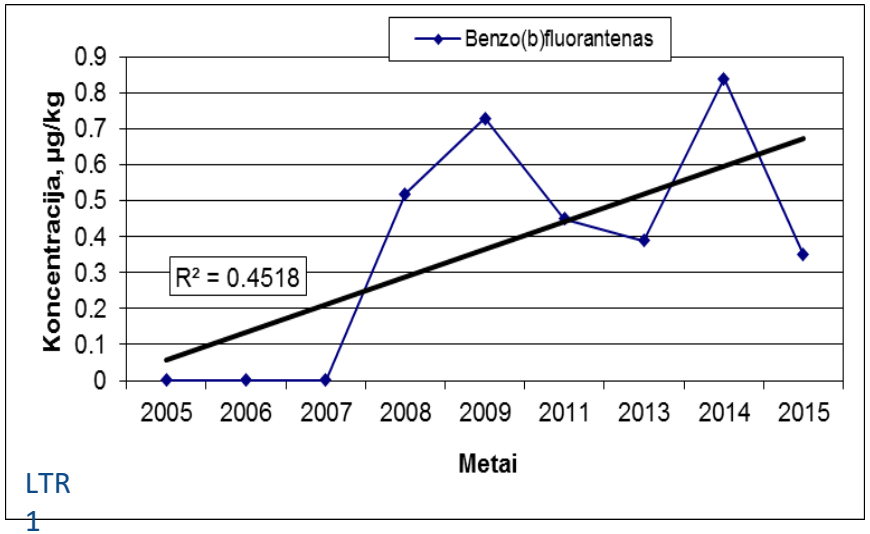


Baltic Sea- Nr 64A-1

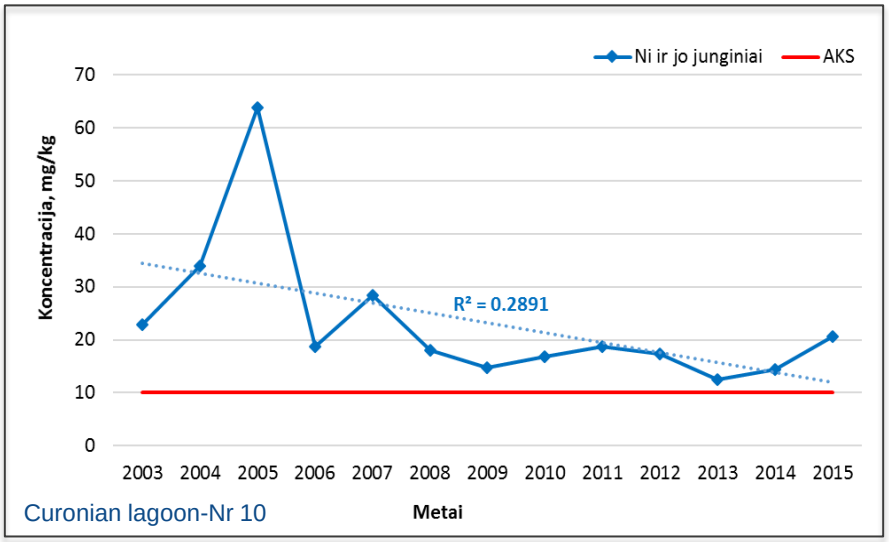
Trends in sediments



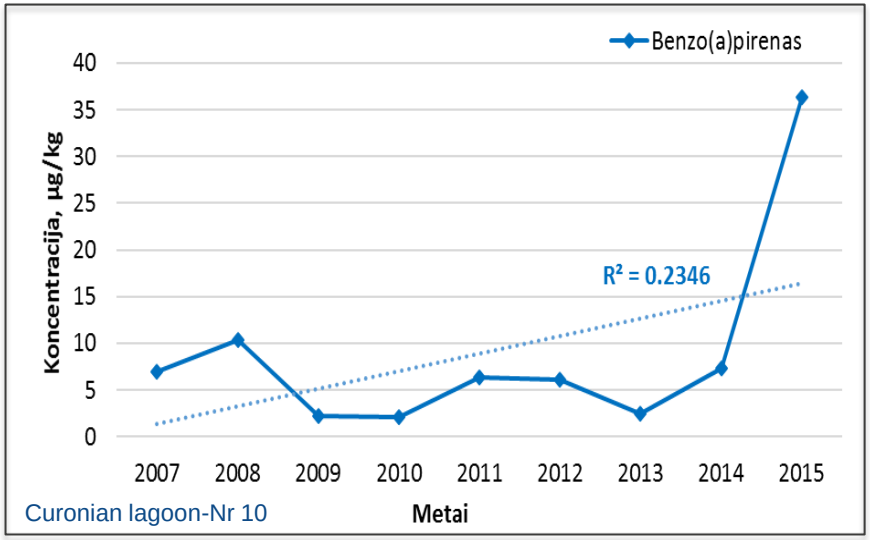
LTR 1



LTR 1

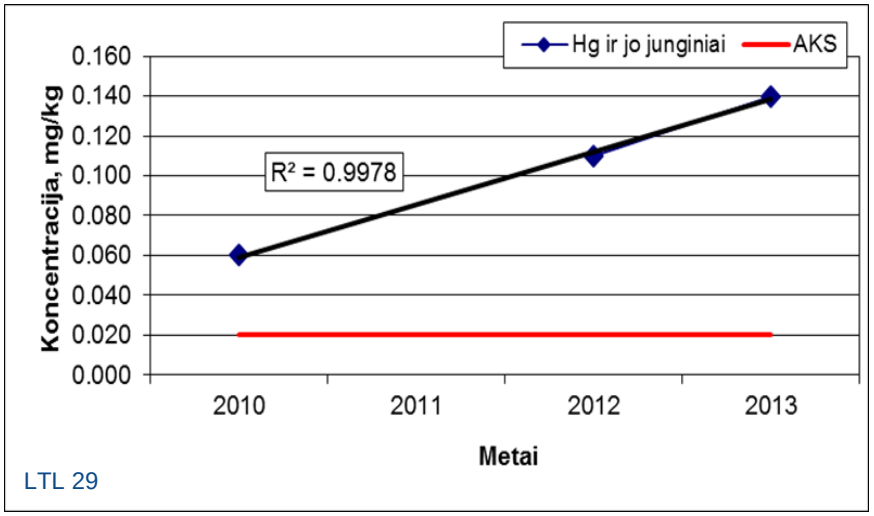


Curonian lagoon-Nr 10

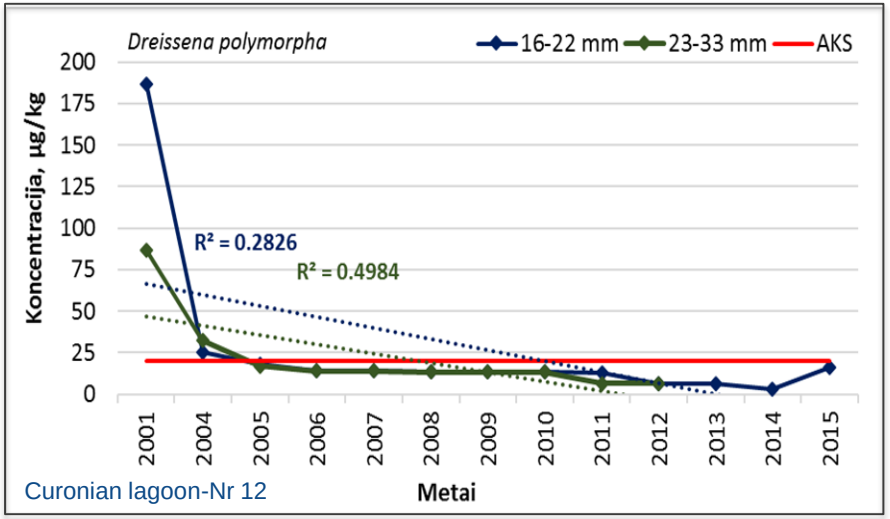


Curonian lagoon-Nr 10

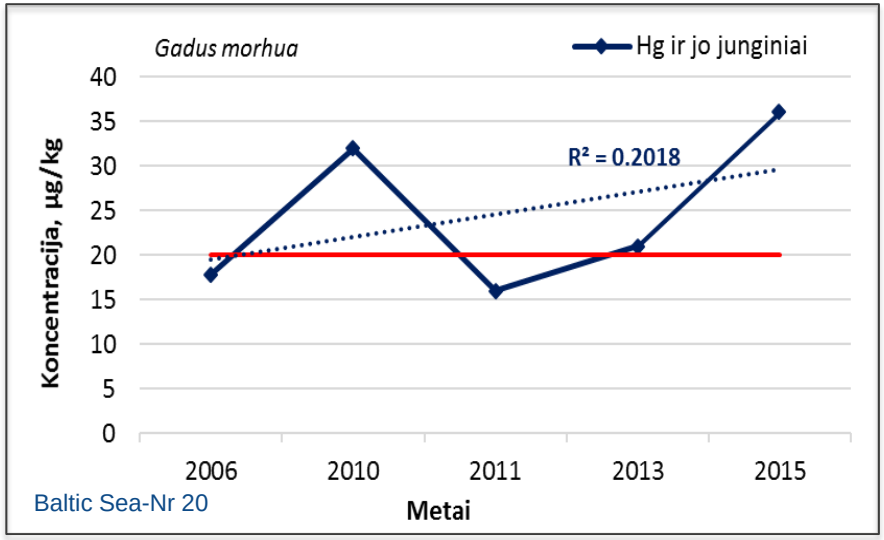
Trends in biota



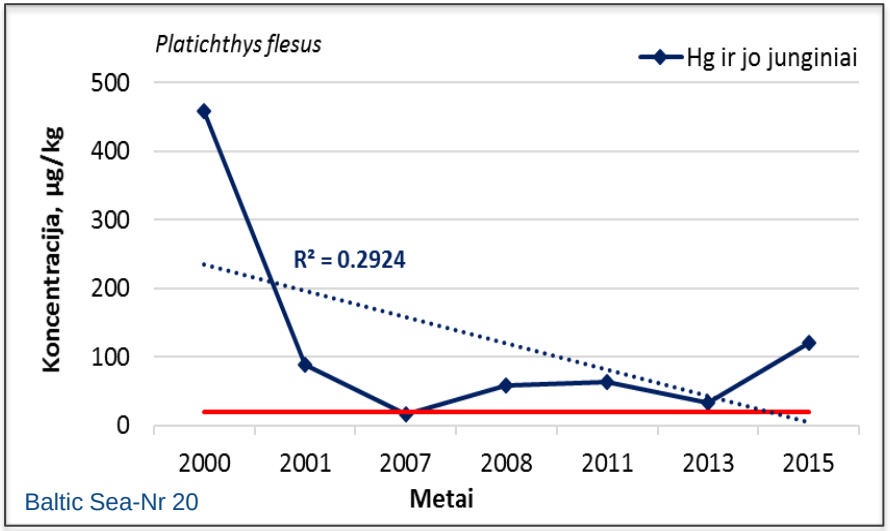
LTL 29



Curonian lagoon-Nr 12



Baltic Sea-Nr 20



Baltic Sea-Nr 20

Pollution source analysis

Wide spectre of analysed information:

- Statistical data on emissions in water & air (point sources)
- Calculated & modelled results on diffuse pollution (air emissions (EMEP, NFR tables), agricultural activities)
- Long-term trends of monitoring results
- Actual gathered monitoring data (water environment & wastewaters)
- Results from previous implemented projects
- Good practice in priority substances management – from Sweden

Most problematic areas	Sectors	Priority substances
Klaipeda area (*Nemunas RBD, Kuršių marios*)	Point & diffuse source (*Industry, transport*)	6 (Cd), 15 (fluoranthene), 28 (PAH), 35 (PFOS), 24/25 (phenols)
Vilnius & Kaunas area (*Nemunas RBD*)	Industry & Municipal Diffuse sources	28 (PAH), 30 (TBT), 35 (PFOS), 43 (HBCDD), 15 (fluoranthene), 6 (Cd), 21 (Hg)
Mažeikiai area (*Venta RBD*)	Industry *(oil refinery)*	28 (PAH), 20 (Pb), 35 (PFOS)
Kulpė river (*Lielupe RBD*)	Industry (*leather & fur tanning*) Diffuse (*agriculture*)	23 (Ni) «New generation» pesticides
Dumping sites & Būtingė oil terminal area (*Baltic Sea*)	Industry (*harbors, oil refinery*)	6 (Cd), 20 (Pb), 23 (Ni), 28 (PAH), 35 (PFOS)
All territory of Lithuania	Point& diffuse source Historical pollution	12 (DEHP), 35 (PFOS), 28 (PAH) *In several areas - 20 (Pb), 23 (Ni), 30 (TBT)* 9b (visas DDT)

Programme of Measures

- Elaborated Programme of Measures for each RBD, as well as for Curonian lagoon and Baltic Sea
- Cost efficiency analysis
- Need for discussion on practical implementation possibilities
- Total costs for Lithuania are:

  3,5 M – 9,6 M EUR

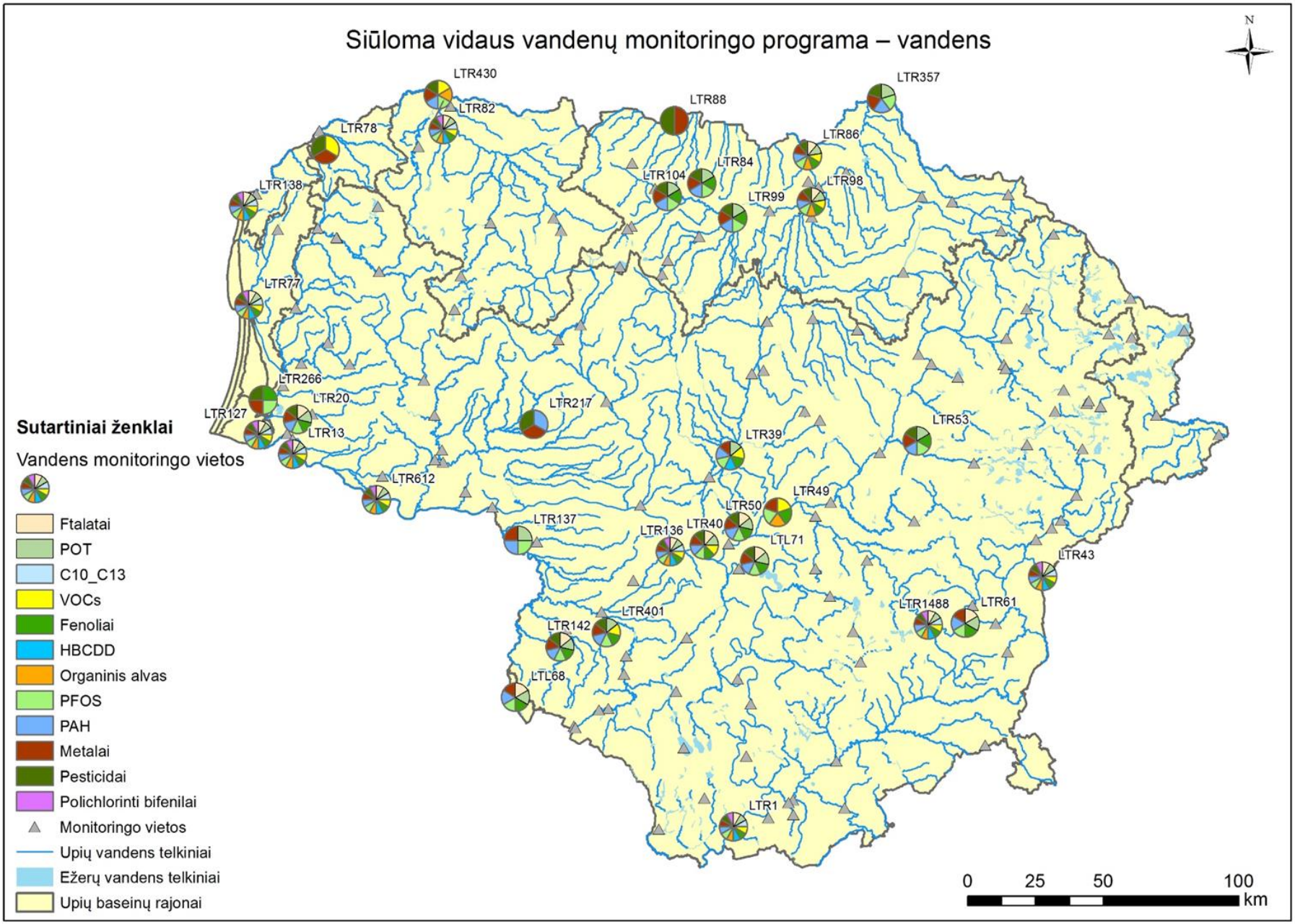
MEASURES	RIVER BASIN DISTRICT	SUBSTANCES
Review environmental permits once in a year	All territory	6, 15, 18, 20, 21, 23, 24, 28, 30, 35
Mixing zone calculation	Nemunas RBD	6, 9b, 11, 12, 15, 20, 21, 23, 24, 25, 28, 30, 32, 35, 41, 42, 43
Use of Best available techniques	All territory	2, 6, 12, 15, 20, 23, 24, 28, 30, 35
Public awareness raising	All territory	6, 12, 15, 18, 20, 21, 23, 24, 25, 28, 30, 32, 35, 41, 43
Changes in legislation	Nemunas RBD, Venta RBD, Curonian lagoon, Baltic Sea	6, 30
Investigative monitoring of “new generation” pesticides	Nemunas RBD, Lielupe RBD	From Nr 34 in list
Improved technologies in WWTP (*activated carbon/ ozonation / electrocoagulation etc*.)	All territory	6, 12, 15, 18, 21, 24, 25, 28, 30, 35
Additional monitoring	Daugava RBD	6, 9b, 20, 21, 23, 28, 35
Statistical data on fertilizer and pesticide use	Lielupe RBD	Heavy metals, pesticides
Research projects	Venta RBD	2, 6, 9a, 23, 24, 25

Monitoring programme optimization

- **Surface water monitoring program by water type** (Baltic sea, Curonian Lagoon, Rivers and Lakes) and **by matrices** (water, bottom sediments, biota) **were developed.**
- For each water type monitoring programmes are available also as MS Excel files.
- Monitoring programmes were developed taking into account monitoring plans developed by the Lithuanian Environment Agency in 2016 .

Surface water monitoring programme

- Main criteria for the selection of stations were high concentrations/EQS exceedances of hazardous substances in a particular station and nearby stations, as well as in the waste water and/or receiving waters. Overall intensity of agricultural and industrial activities or level of urbanization was also taken into account.
- Surface water. We suggest to include 17 additional monitoring stations to existing monitoring network.
- Sediments. Monitoring data available for the analysis came from 118 river and lake monitoring stations. Of these, only 17 river and lake stations have sediment monitoring data after 2010. Overall monitoring design for the 19 river stations and 1 lake station was chosen based on the maximum priority set for each substance.
- Biota. Overall monitoring design for the 12 river stations and one lake station was chosen based on the maximum priority set for each substance. All substances for which biota EQS are established are included in the programme.


Siūloma vidaus vandenų monitoringo programa – vandens
N
LTR430
LTR82
LTR78
LTR88
LTR357
LTR86
LTR84
LTR104
LTR98
LTR99
LTR138
LTR77
LTR266
LTR20
LTR127
LTR13
LTR217
LTR53
LTR39
LTR612
LTR49
LTR50
LTR137
LTR136
LTR40
LTL71
LTR43
LTR1488
LTR61
LTR401
LTR142
LTL68
LTR1
Sutartiniai ženklai
Vandens monitoringo vietos
Ftalatai
POT
C10_C13
VOCs
Fenoliai
HBCDD
Organinis alvas
PFOS
PAH
Metalai
Pesticidai
Polichlorinti bifenilai
Monitoringo vietos
Upių vandens telkiniai
Ežerų vandens telkiniai
Upių baseinų rajonai
0
25
50
100
km

Curonian lagoon monitoring programme

- One or two most representative monitoring stations were chosen for each of the three Curonian lagoon parts and where the monitoring frequency should be increased:
  - Stations Nr 2 and 3B (Klaipeda harbor aquatorium)
  - Stations Nr 5 (Northern aquatorium)
  - Stations Nr 10 and 14 (Central part (LT)).
- In comparison to actual Curonian lagoon monitoring plan, we recommend to increase number of monitored priority substances in surface water and decrease number of monitored pesticides in sediments.
- Depending on their occurrence and EQS exceedances, priority substances for surface monitoring were divided into two groups: high priority (heavy metals, fluoranthene, PAH (Nr 28), HCH, DDT, PFOS, DEHP) and low priority (all other) substances.

For sediments high priority substances were also tributyltin, anthracene, naphthalene.

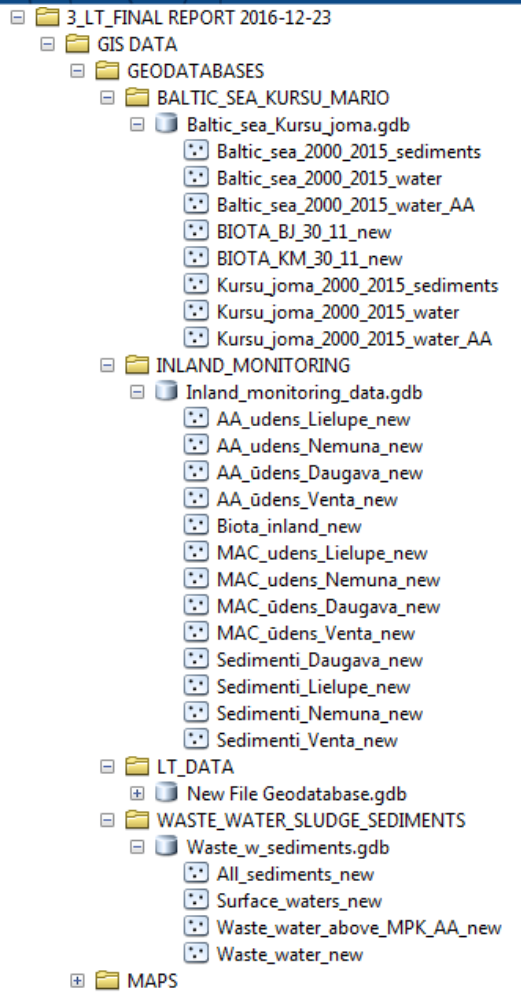
Baltic Sea monitoring programme

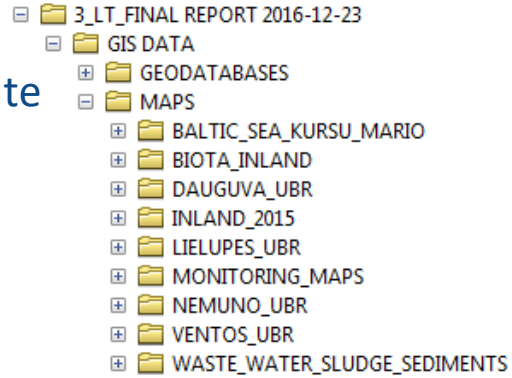
- Taking into account the monitoring time series and frequency of EQS exceedances, following monitoring stations were chosen as the most representative for the sea waters:
  - stations 1B and B-1 (northern coastal waters),
  - station No 4 (transitional waters),
  - station No 7 (southern coastal waters),
  - station No 20 (central part, coastal waters up to 12 nautical miles from the coast)
  - station No 65 (open sea).
- Depending on their occurrence and EQS exceedances, priority substances for surface monitoring were divided into two groups: high priority (heavy metals, PAH (No 28), HCH, DEHP) and low priority (all other) substances.

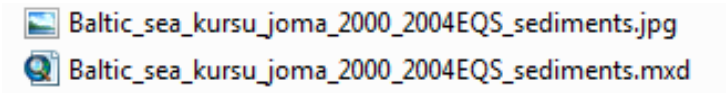
For sediments high priority substances were also total DDT, PFOS.

GIS database and maps summary

- 3 main geodatabases and 1 additional geodatabase:
  - For work with file geodatabases use Arc Catalog;
  - Main geodatabases consists of 25 feature classes which summarizes all monitoring results;
  - Picture to the right shows the structure of the geodatabases;
  - «LT_DATA» geodatabase includes all basic data for Lithuania.
- «Maps» folder includes 9 different folders of maps and appropriate .mxd files that represents all results asked to be shown in the maps:
  - In these folders the total amount of maps and .mxd is 77;
  - For each map there is appropriate .mxd file with the same name.







Use of file geodatabase and feature classes (I)

Table

AA_ūdens_Venta_new

OBJECTID *	RBD	Category	River_lake_name	Station	Station_ID	Year_	X	Y	Monitoring	Nr_in_dir	Substance	Unit	AA	AA_EQS	LOQ_value	Difference	Aaexceed	NAME	NAME_LT	EU_
17	Venta	Upė	Venta	Žemiau Mažeikių	LTR82	2015	390928.5001	6252723.25	BIOR data	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pirenas	mikrg/l	0.000094	0.00017	0.00005	0.000076	0	Venta	Venta	LT2300(
29	Venta	Upė	Venta	Žemiau Mažeikių	LTR82	2015	390928.5001	6252723.25	BIOR data	DDTsum	DDT visas	mikrg/l	0.015938	0.025	0.003	0.009062	0	Venta	Venta	LT2300(
39	Venta	Upė	Venta	Žemiau Mažeikių	LTR82	2015	390928.5001	6252723.25	BIOR data	Benzo(k)fluoranthene	Benzo(k)fluorantenas	mikrg/l	0.000025	0.00017	0.00005	0.000145	0	Venta	Venta	LT2300(
49	Venta	Upė	Venta	Žemiau Mažeikių	LTR82	2015	390928.5001	6252723.25	BIOR data	Benzo(g,h,i)perylene	Benzo(g,h,i)perilenas	mikrg/l	0.000356	0.00017	0.00005	-0.000186	1	Venta	Venta	LT2300(
59	Venta	Upė	Venta	Žemiau Mažeikių	LTR82	2015	390928.5001	6252723.25	BIOR data	Benzo(b)fluoranthene	Benzo(b)fluorantenas	mikrg/l	0.000353	0.00017	0.00005	-0.000183	1	Venta	Venta	LT2300(

- Search for necessary data, results in attribute table;
- Export tables as excel or other file format;
- Add new data to the feature classes or edit old data;
- Sort by name, results, data, year, station and e.t.c.;

Use of file geodatabase and feature classes (II)

- Make new analysis, for example, buffer zones, distance to pollutants, different statistics;
- Make additional maps as necessary;
- Join data, make other geodatabases and feature classes;
- Use project results for HELCOM reports and other needs.

Benefits for us

- We can understand Lithuanian quite good to write something in Lithuanian ☺
- Now we know where to look on LT-LV border, to find transboundary pollution
- We have increased our knowledge of priority substances

VSIA “LATVIJAS VIDES, ĢEOLOĢIJAS UN METEOROLOĢIJAS CENTRS”

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