LIFE GoodWater IP approach to planning and implementing measures for improvement of water quality – agriculture land

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EU LIFE Programme integrated project
"Implementation of River Basin Management Plans of Latvia towards good surface water status"

The overall aim of the LIFE GOODWATER IP project

Improve the status of water bodies at risk in Latvia through targeted water quality monitoring and implementation of measures as described in the Daugava, Gauja, Lielupe and Venta River Basin Management Plans, which are periodically updated according to the EU Water Framework Directive.

A1 Preparatory activities for reducing pollution with nutrients from agriculture

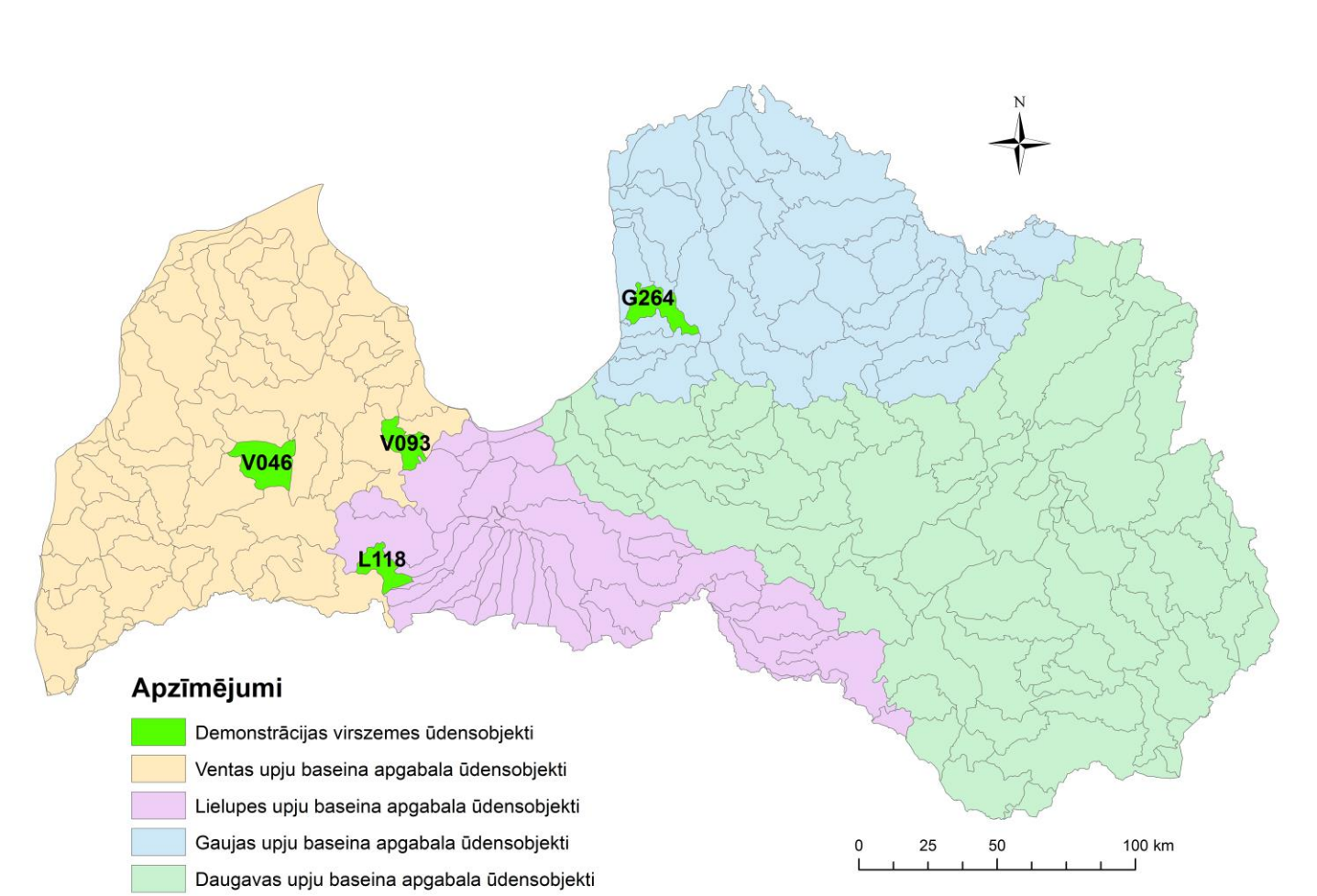
A1.1. Inspection and assessment of the sources of pollution with nutrients from agricultural areas in the selected water bodies at risk (V093 Slocene, G264 Aģe, L118 Auce, and V046 Ēda)

Contribution of the beneficiaries:

LEGMC - Monthly water sampling and discharge measurement activities in the selected water bodies at risk, summary of monitoring results.

LLU – Processing, analysis, and representation of water quality monitoring results and geospatial data for V093 Slocene, G264 Aģe, L118 Auce, and V046 Ēda to identify potential sources of nutrient losses and ensure targeted selection and implementation of water and nutrient retention measures as part of A1.2. and A1.4.

The selected water bodies at risk - V093 Slocene, G264 Aģe, L118 Auce, and V046 Ēda

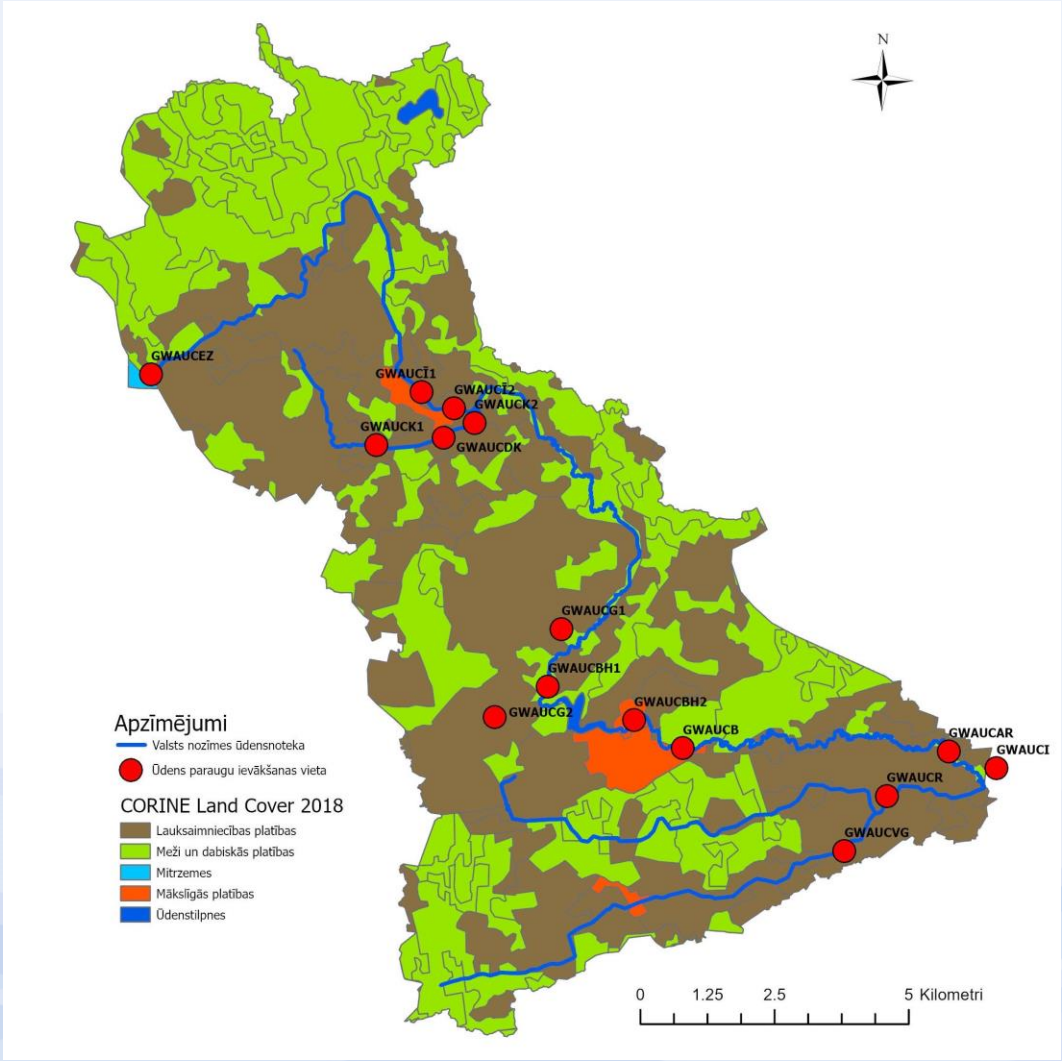


The selection of water quality monitoring sites at V093 Slocene, G264 Aģe, L118 Auce, and V046 Ēda

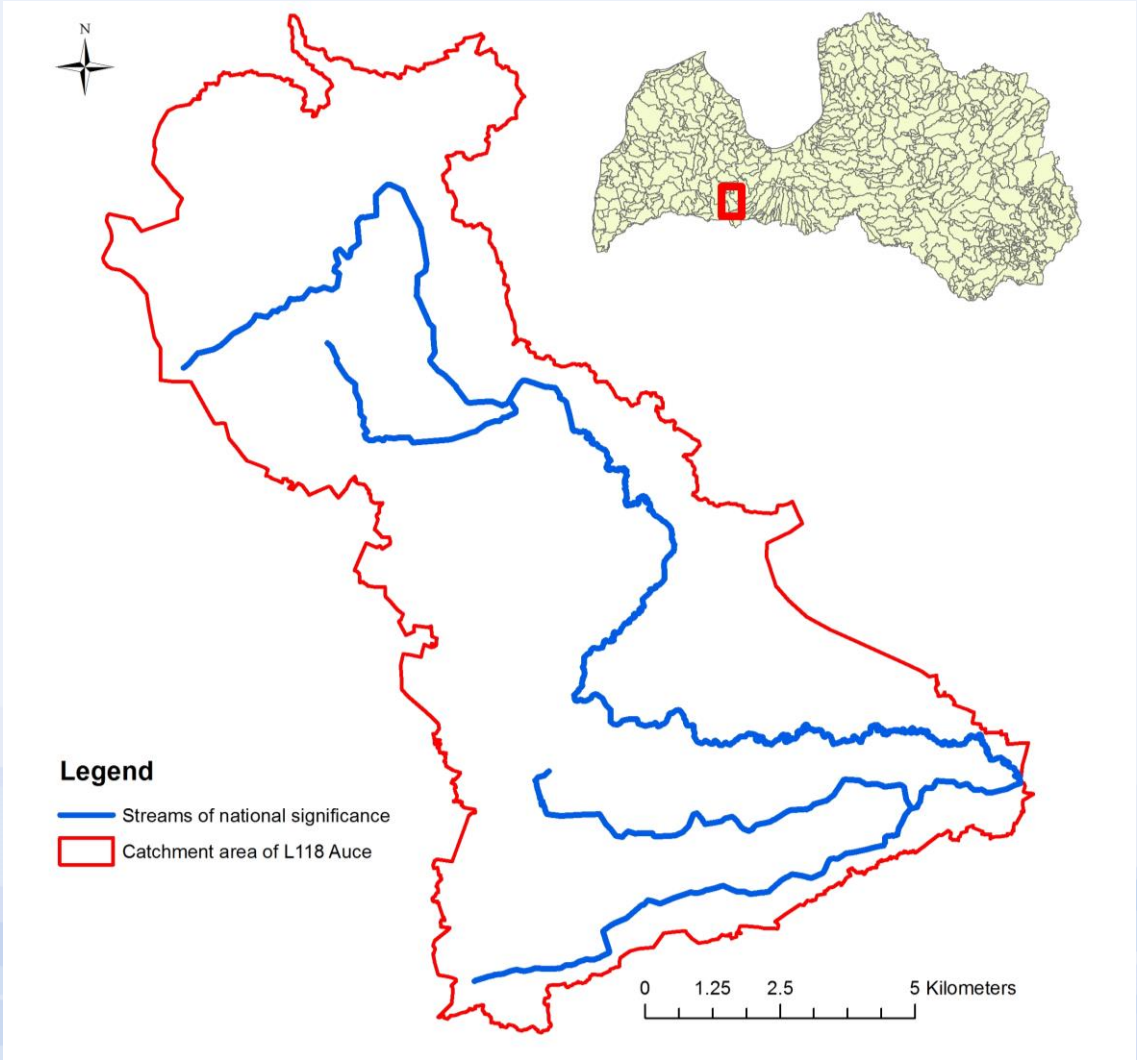
The following geospatial datasets have been processed using ArcGIS software:

- ✓ Land use cover to estimate the share of artificial surfaces, agricultural areas, forested areas, wetlands, and water bodies (source: Corine Land Cover 2018);
- ✓ Distribution of agricultural crops and land use (source: Rural Support Service of Latvia);
- ✓ Digital Drainage Cadaster on subsurface and surface drainage systems in agricultural and forested areas (source: REMA; LEGMC);
- ✓ Digital elevation model as derived from LiDAR (source: Latvian Geospatial Information Agency, LEGMC);
- ✓ Existing livestock facilities as potential source of agricultural point source pollution (source: Agricultural Data Centre of Latvia; LEGMC);
- ✓ Number and spatial distribution of the existing wastewater treatment plants and their treatment efficiency (source: LEGMC);
- ✓ Number and spatial distribution of the existing small hydropower plants and water reservoirs (source: LEGMC).

Corine Land Cover 2018 - L118 Auce

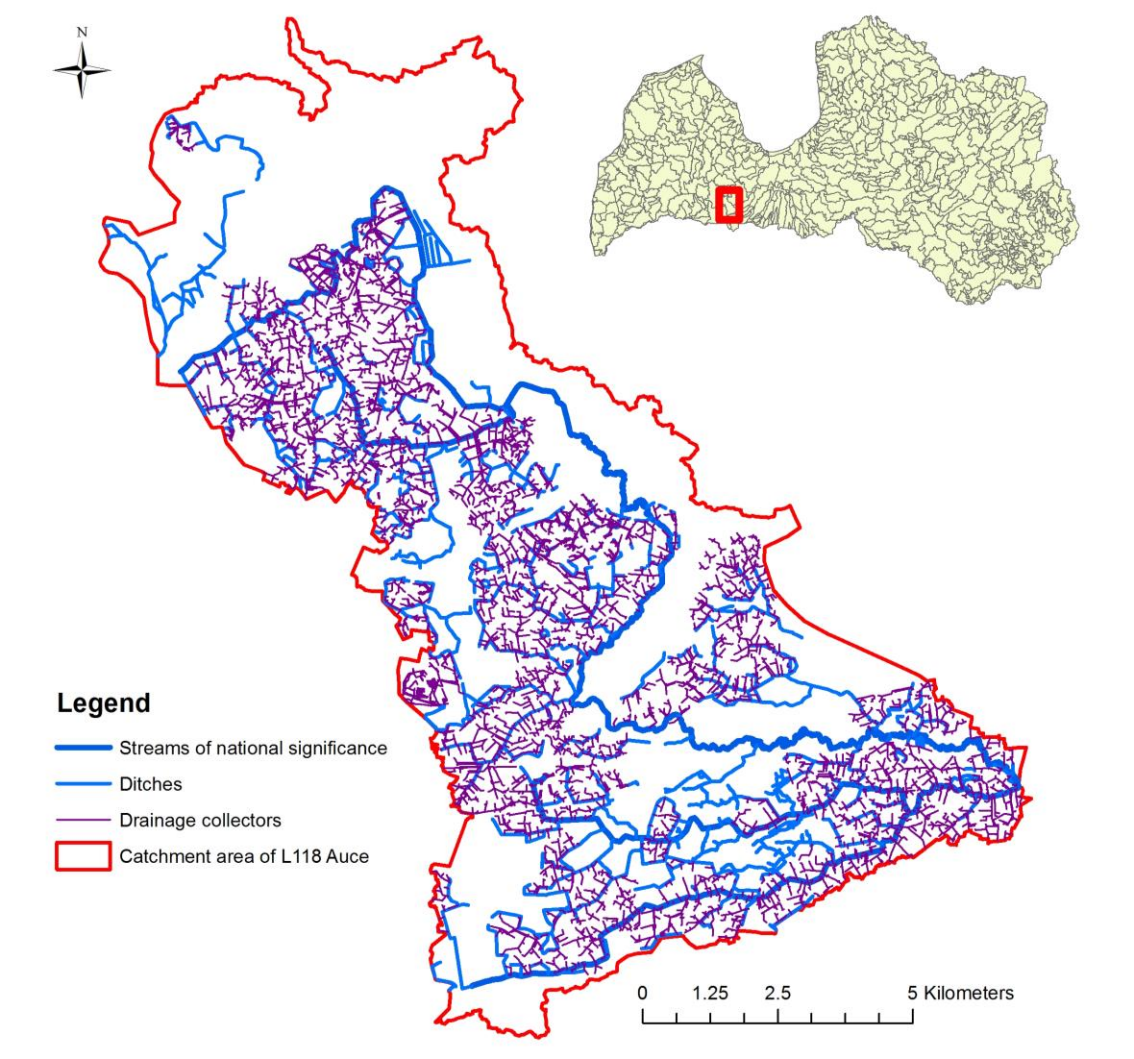


Streams of national significance - L118 Auce

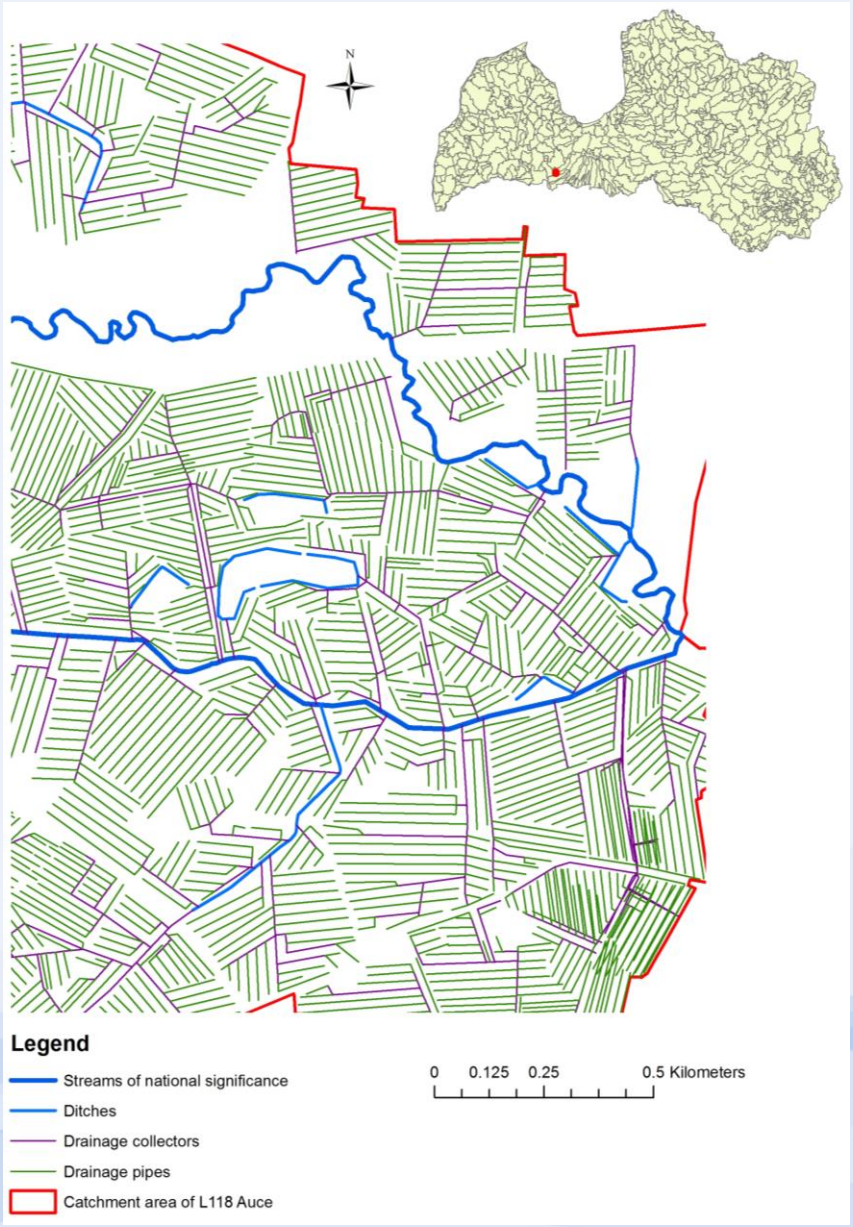


Streams of national significance and ditches - L118 Auce

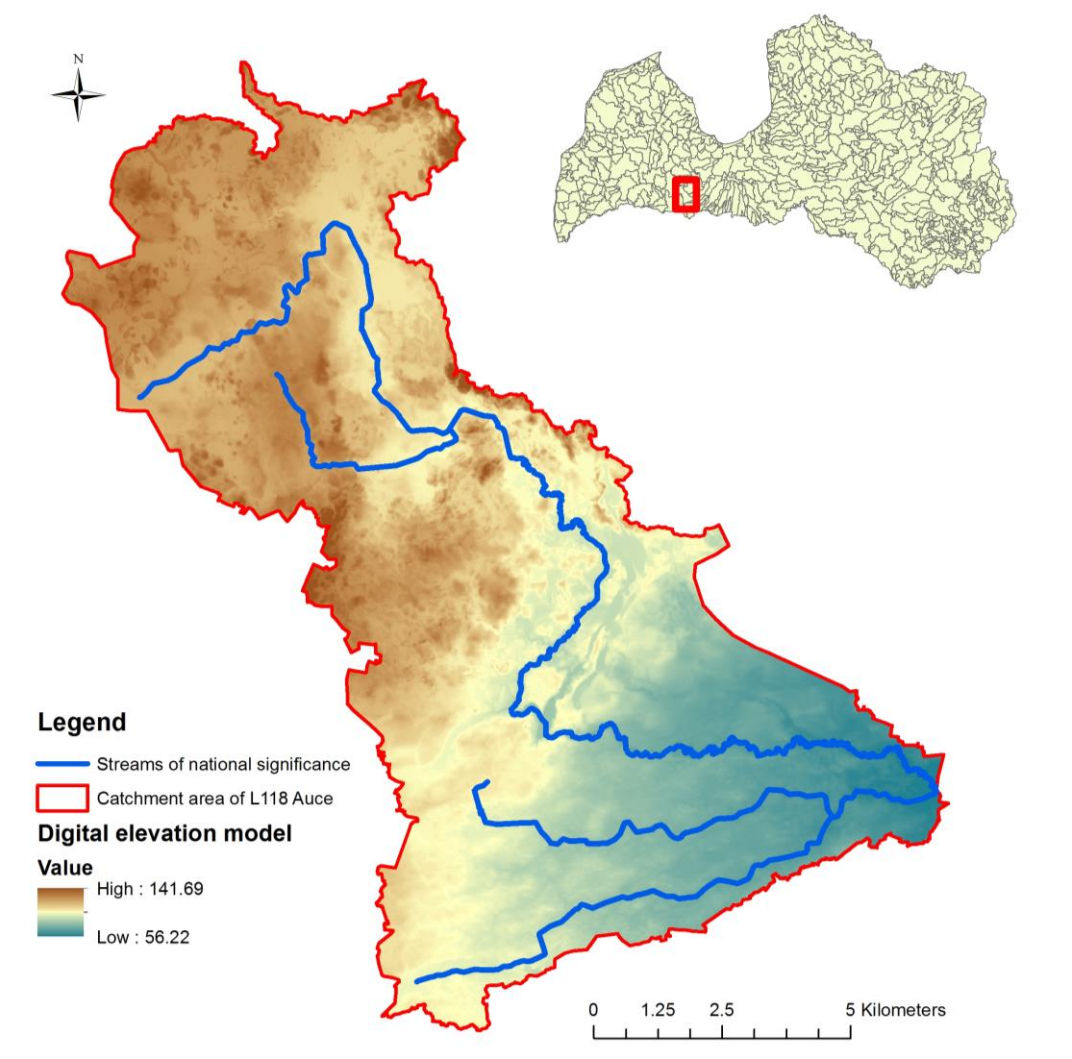
Streams of national significance, ditches and drainage collectors - L118 Auce



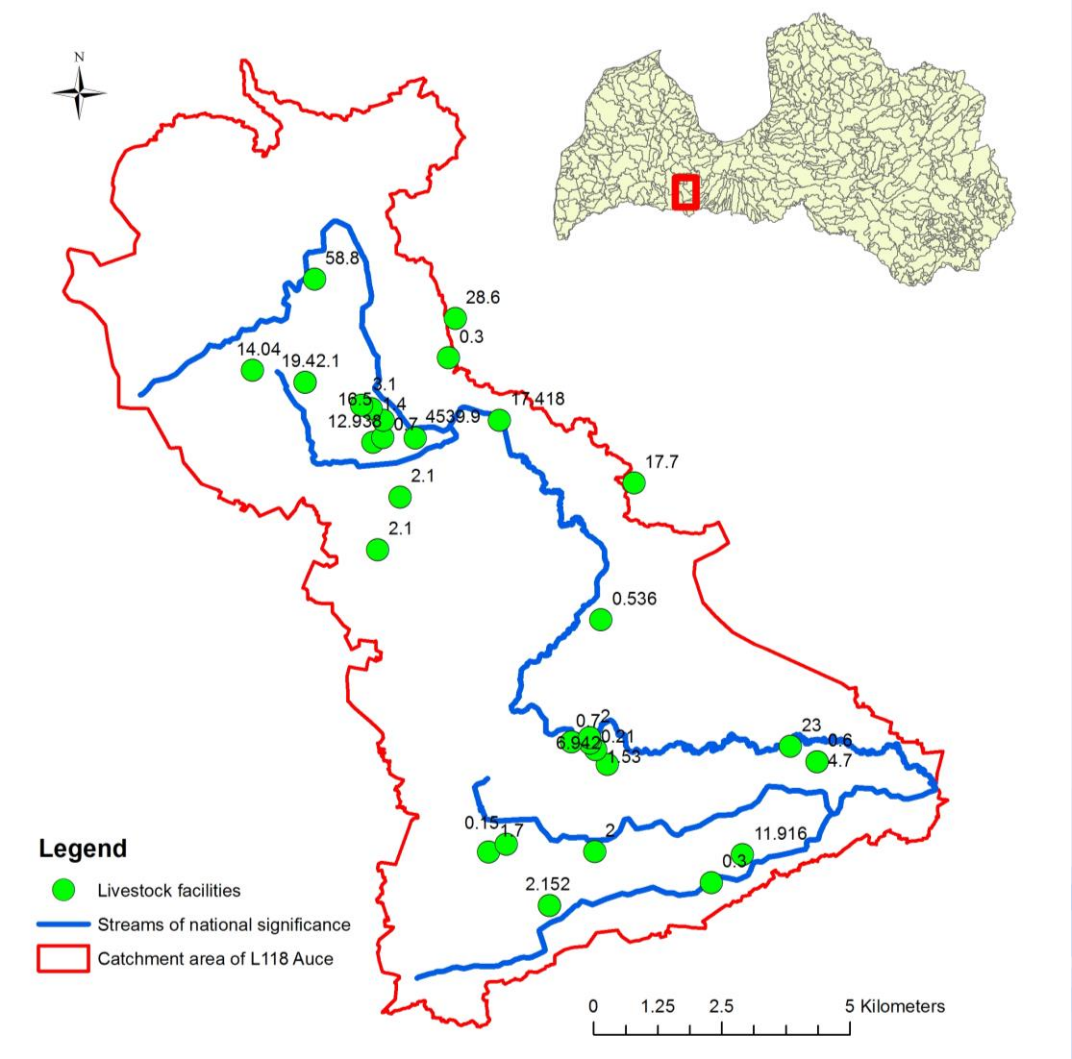
Streams of national significance, ditches, drainage collectors, drainage pipes - L118 Auce



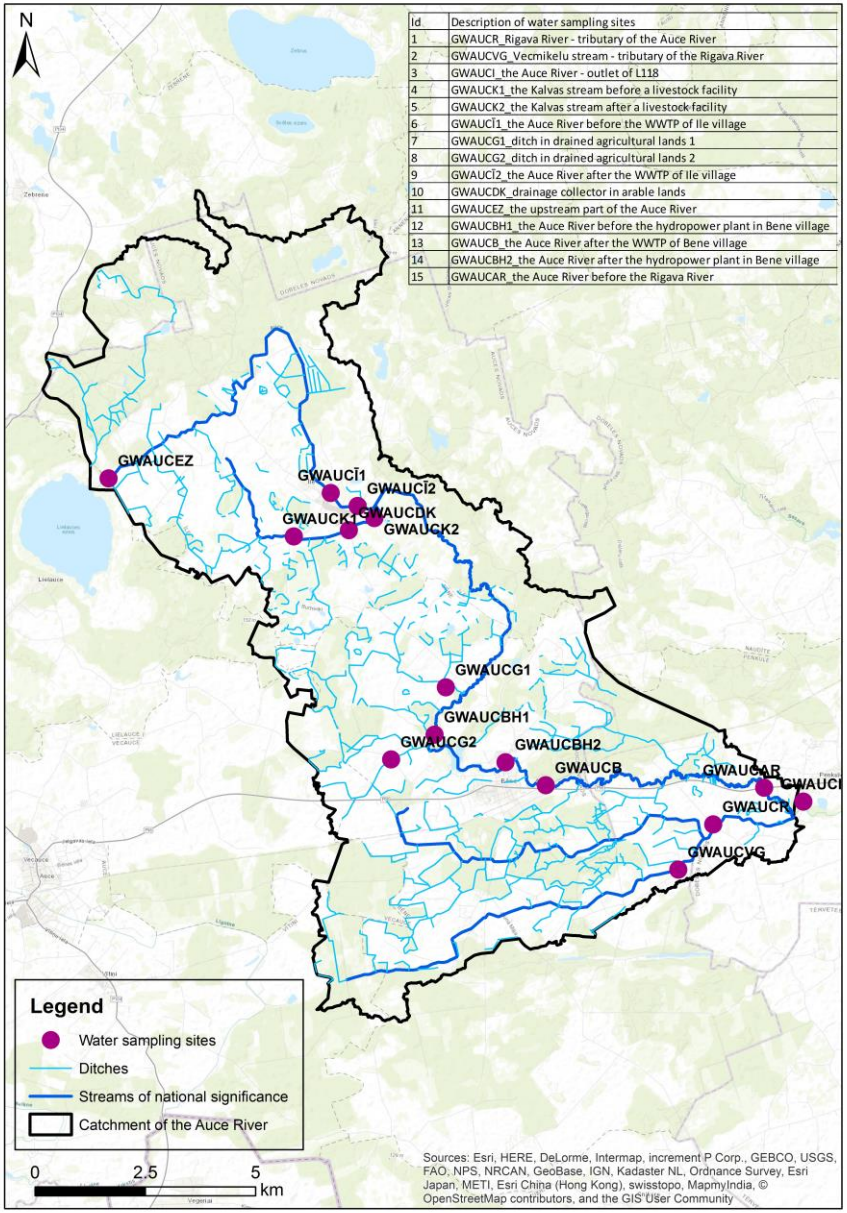
Digital elevation model - L118 Auce



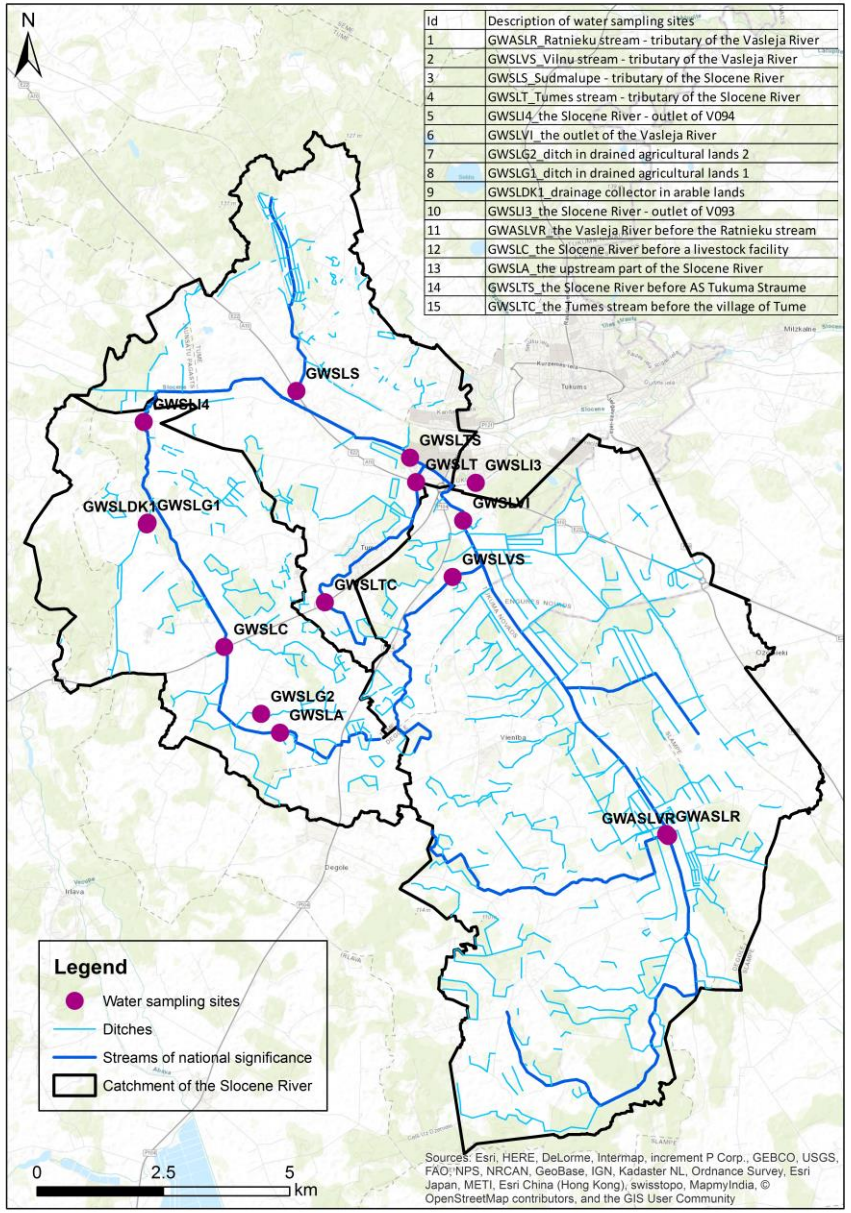
Livestock facilities - L118 Auce



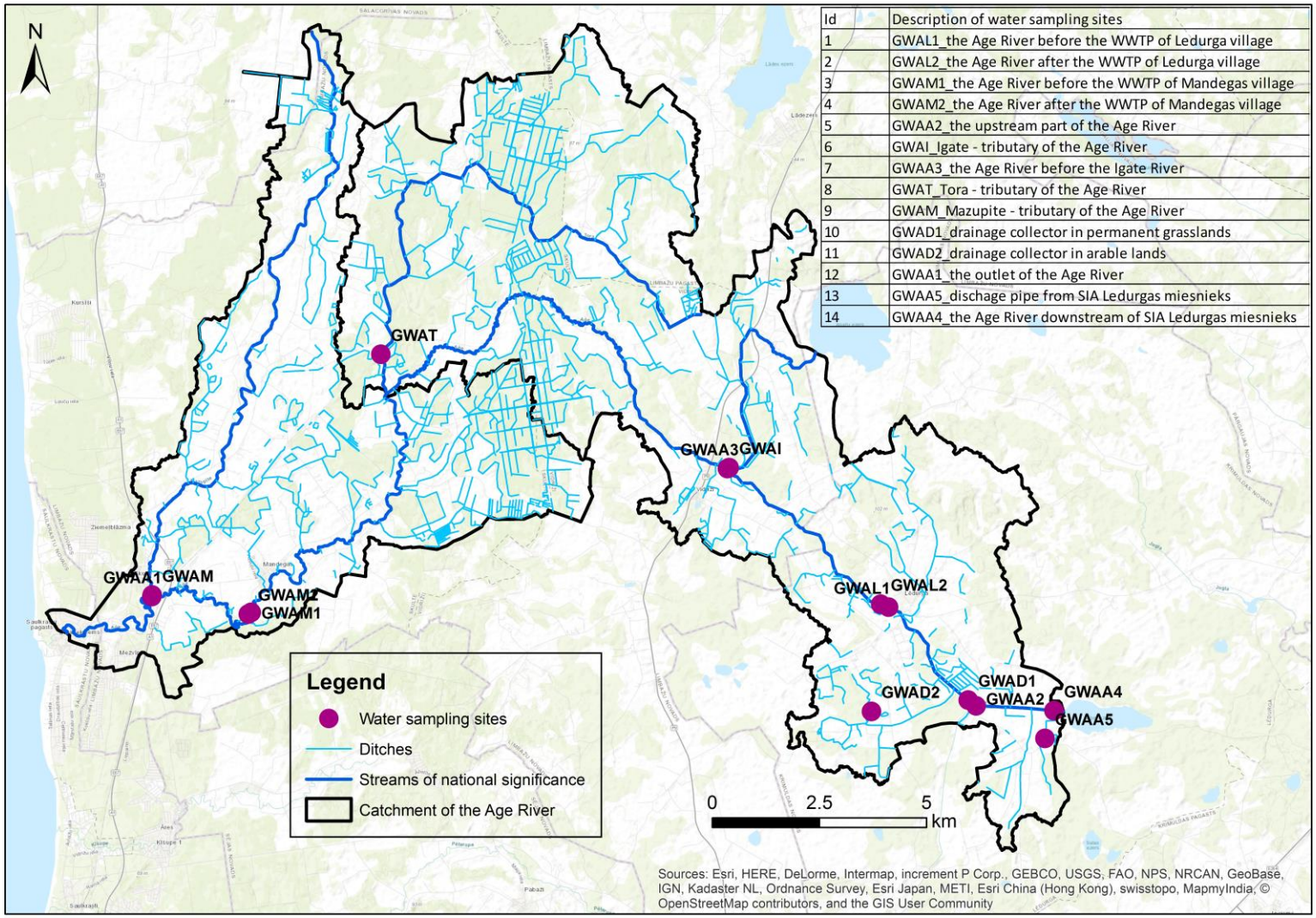
The water sampling sites at L118 Auce



The water sampling sites at V093 Slocene

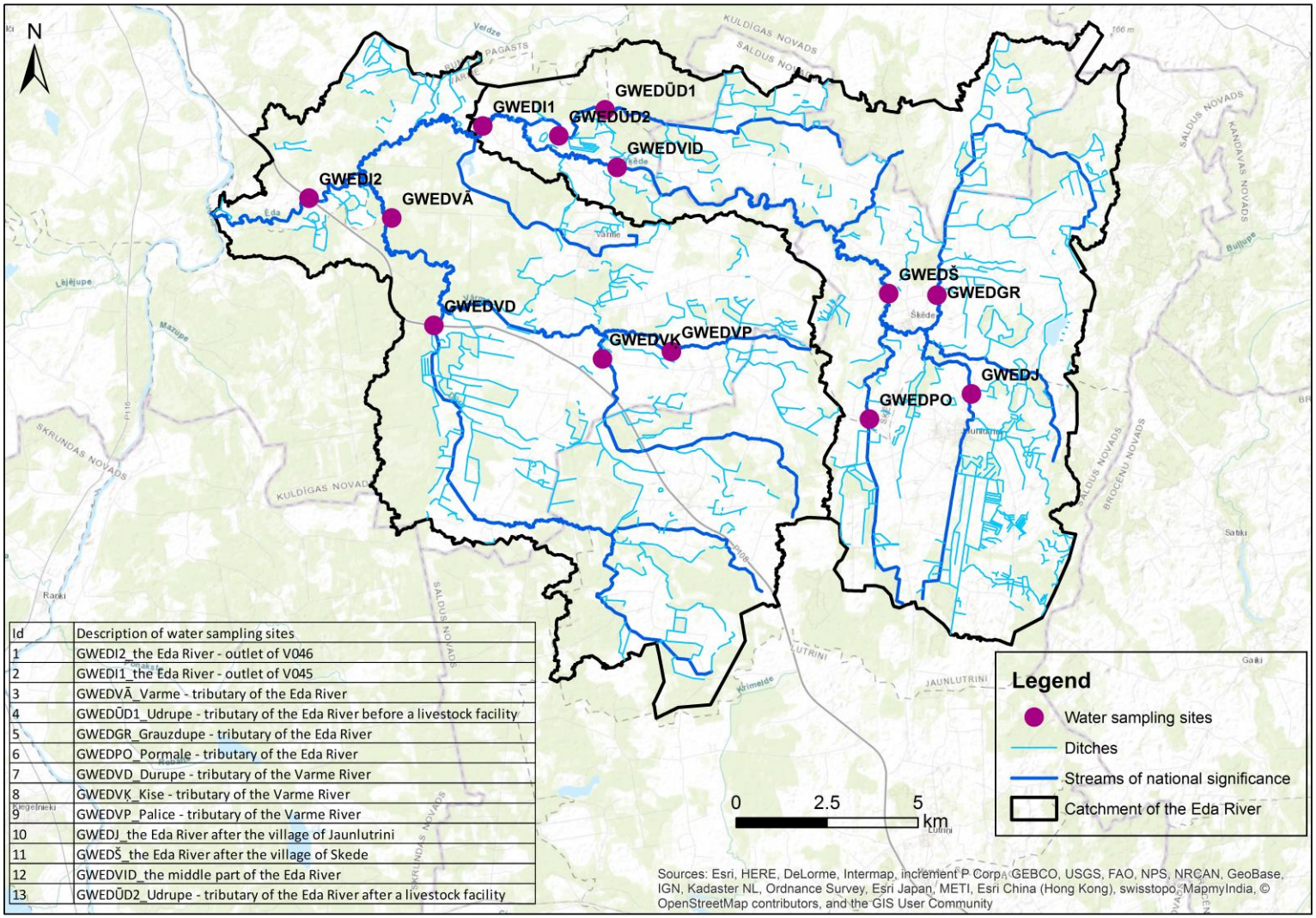


The water sampling sites at G264 Aģe



Id	Description of water sampling sites
1	GWAL1_the Age River before the WWTP of Ledurga village
2	GWAL2_the Age River after the WWTP of Ledurga village
3	GWAM1_the Age River before the WWTP of Mandegas village
4	GWAM2_the Age River after the WWTP of Mandegas village
5	GWAA2_the upstream part of the Age River
6	GWAI_Igate - tributary of the Age River
7	GWAA3_the Age River before the Igate River
8	GWAT_Tora - tributary of the Age River
9	GWAM_Mazupite - tributary of the Age River
10	GWAD1_drainage collector in permanent grasslands
11	GWAD2_drainage collector in arable lands
12	GWAA1_the outlet of the Age River
13	GWAA5_dischage pipe from SIA Ledurgas miesnieks
14	GWAA4_the Age River downstream of SIA Ledurgas miesnieks

The water sampling sites at V046 Ēda



Id	Description of water sampling sites
1	GWEDI2_the Eda River - outlet of V046
2	GWEDI1_the Eda River - outlet of V045
3	GWEDVĀ_Varme - tributary of the Eda River
4	GWEDŪD1_Udrupe - tributary of the Eda River before a livestock facility
5	GWEDGR_Grauzdupe - tributary of the Eda River
6	GWEDPO_Pormale - tributary of the Eda River
7	GWEDVD_Durupe - tributary of the Varme River
8	GWEDVK_Kise - tributary of the Varme River
9	GWEDVP_Palice - tributary of the Varme River
10	GWEDJ_the Eda River after the village of Jaunlutrini
11	GWEDŠ_the Eda River after the village of Skede
12	GWEDVID_the middle part of the Eda River
13	GWEDŪD2_Udrupe - tributary of the Eda River after a livestock facility

The results of geospatial data analysis – Corine Land Cover 2018

Water body	G264 Aģe	L118 Auce	V046 Ēda	V093 Slocene
Catchment area, km^2	183.6	128.5	300.9	149.9

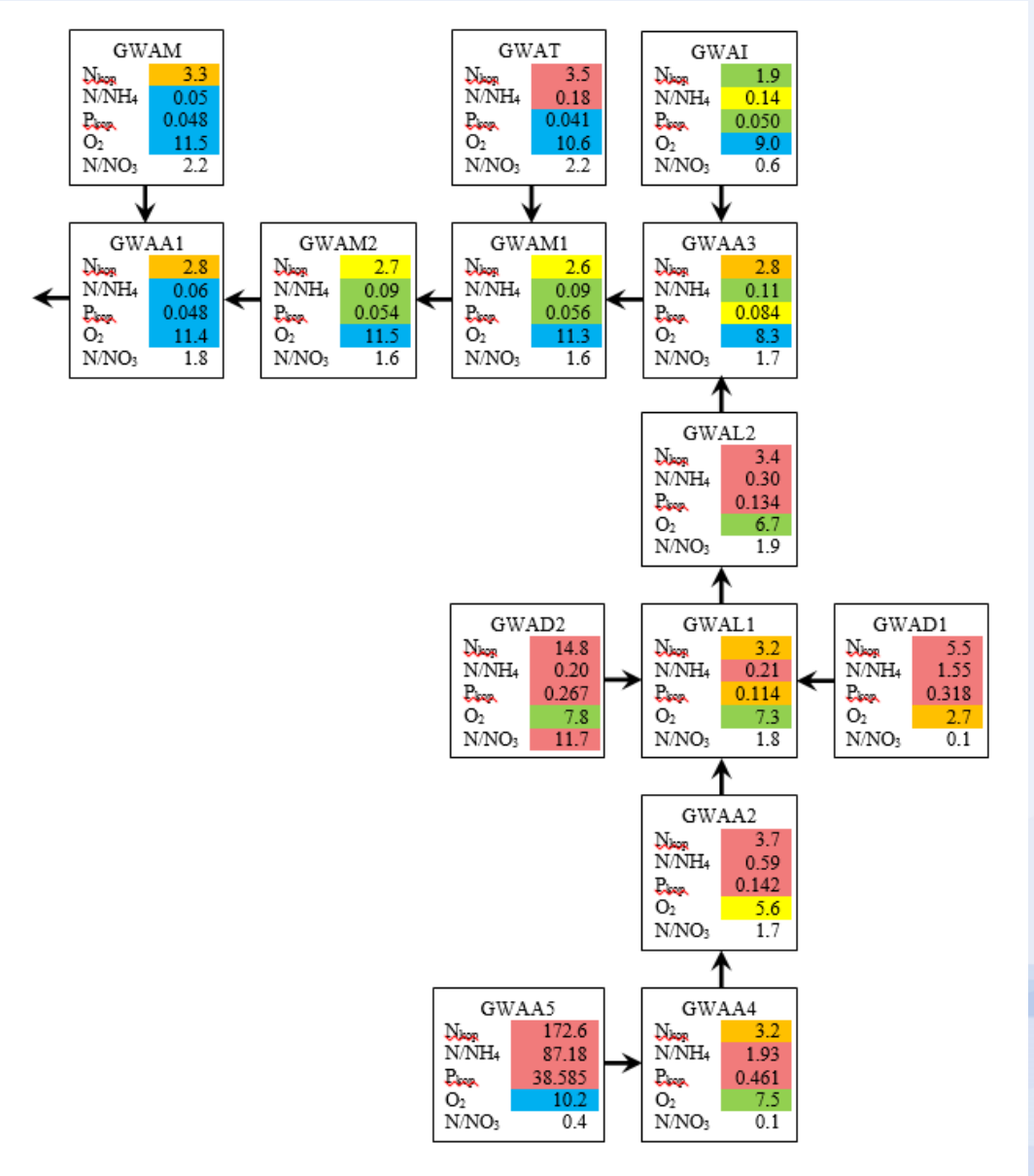
Land use	G264 Aģe, %	L118 Auce, %	V046 Ēda , %	V093 Slocene, %
Artificial surfaces	1.9	2.1	0.7	2.8
Agricultural areas	50.3	52.3	53.5	72.2
Forest and semi-natural areas	46.2	45.0	44.5	24.2
Wetlands	1.7	0.1	1.1	0.7
Water bodies	0.0	0.4	0.2	0.0

The results of geospatial data analysis – Corine Land Cover 2018 for the catchment area of water sampling sites at L118 Auce

Nr.	Catchment ID	Catchment area, km²	Artificial surfaces, %	Agricultural areas, %	Forest and semi-natural areas, %	Wetlands, %	Water bodies, %
1	GWAUCR	47.6	3.9	68.2	27.9	0.0	0.0
2	GWAUCVG	22.3	1.1	63.7	35.1	0.0	0.0
3	GWAUCI	128.5	2.1	52.3	45.0	0.1	0.4
4	GWAUCK1	15.8	0.0	91.0	9.0	0.0	0.0
5	GWAUCK2	39.8	1.3	81.5	17.2	0.0	0.0
6	GWAUCĪ1	46.1	1.1	43.8	54.1	0.4	0.6
7	GWAUCG1	19.5	0.0	76.3	23.7	0.0	0.0
8	GWAUCG2	18.8	0.0	83.7	16.3	0.0	0.0
9	GWAUCĪ2	46.1	1.1	43.8	54.1	0.4	0.6
10	GWAUCDK	4.2	0.0	70.1	29.9	0.0	0.0
11	GWAUCEZ	31.4	2.1	28.5	45.9	11.4	12.1
12	GWAUCBH1	84.0	0.6	53.0	45.9	0.2	0.3
13	GWAUCB	90.7	2.7	52.4	44.0	0.2	0.6
14	GWAUCBH2	89.9	2.8	52.9	43.5	0.2	0.6
15	GWAUCAR	109.9	2.3	54.2	42.9	0.1	0.5

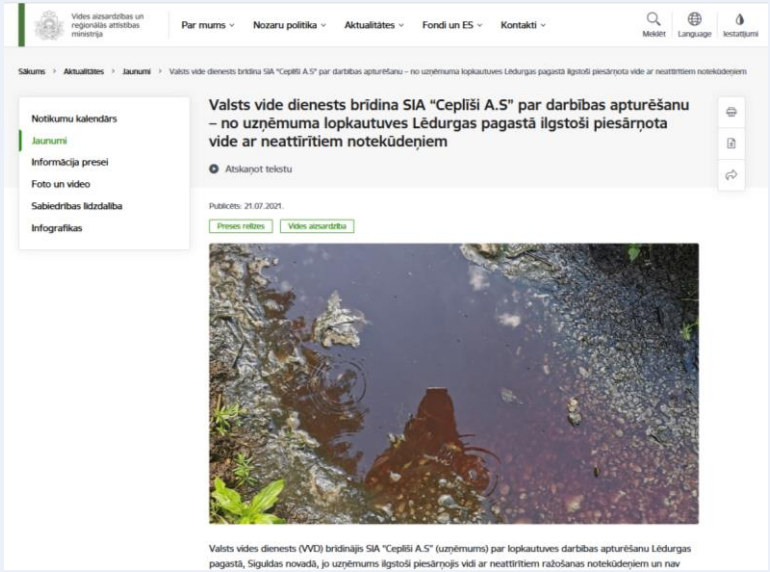
The water quality monitoring results at G264 Aģe

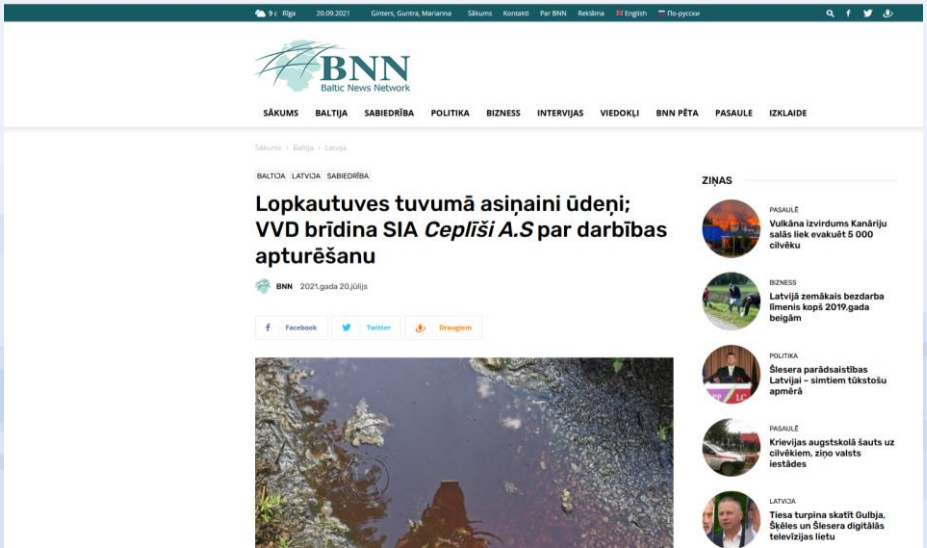
Id	Description of water sampling sites
1	GWAL1_the Age River before the WWTP of Ledurga village
2	GWAL2_the Age River after the WWTP of Ledurga village
3	GWAM1_the Age River before the WWTP of Mandegas village
4	GWAM2_the Age River after the WWTP of Mandegas village
5	GWAA2_the upstream part of the Age River
6	GWAI_Igate - tributary of the Age River
7	GWAA3_the Age River before the Igate River
8	GWAT_Tora - tributary of the Age River
9	GWAM_Mazupite - tributary of the Age River
10	GWAD1_drainage collector in permanent grasslands
11	GWAD2_drainage collector in arable lands
12	GWAA1_the outlet of the Age River
13	GWAA5_dischage pipe from SIA Ledurgas miesnieks
14	GWAA4_the Age River downstream of SIA Ledurgas miesnieks



High	Good	Moderate	Poor	Bad

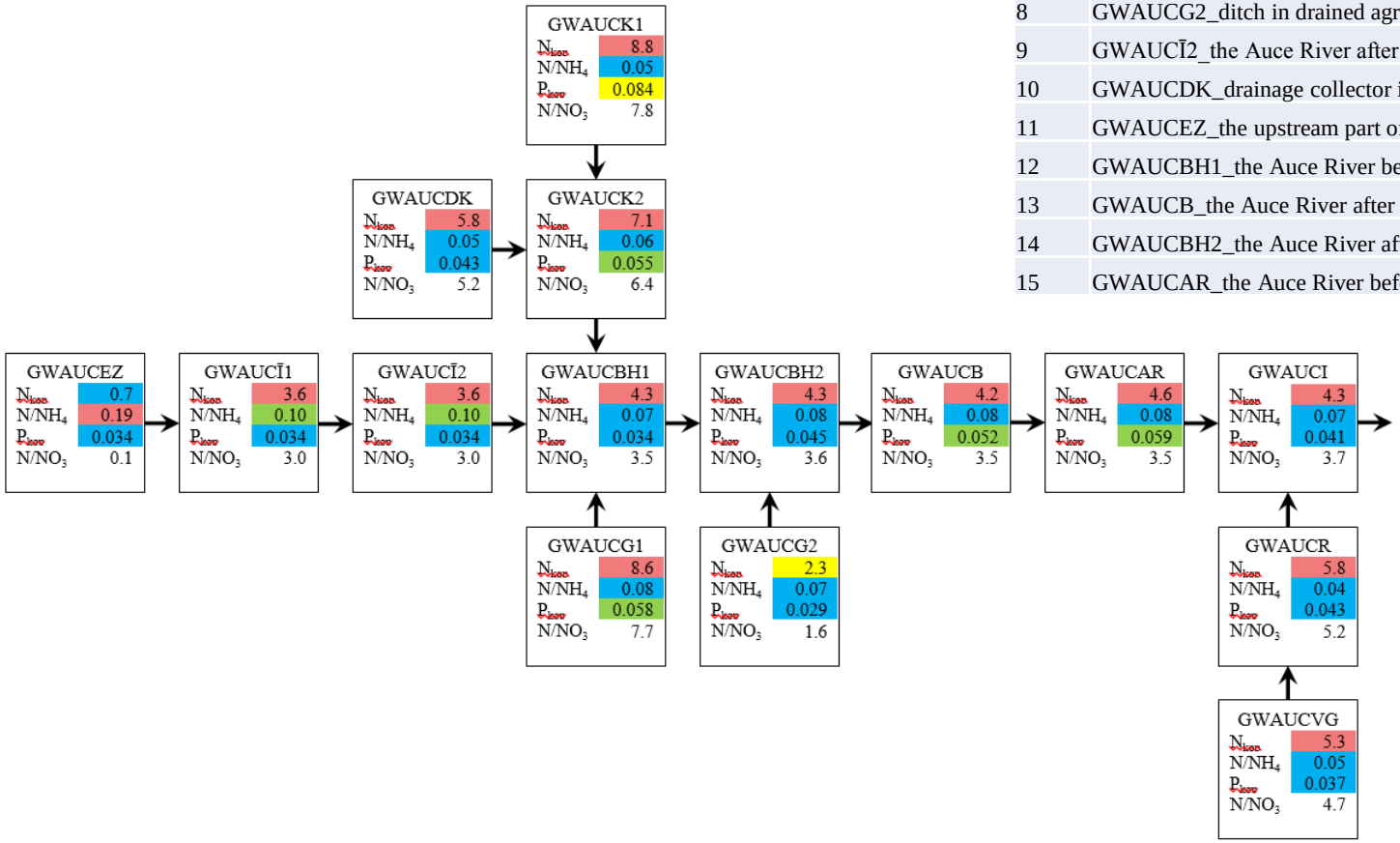
The environmental problem addressed in G264 Aģe





The water quality monitoring results at L118 Auce

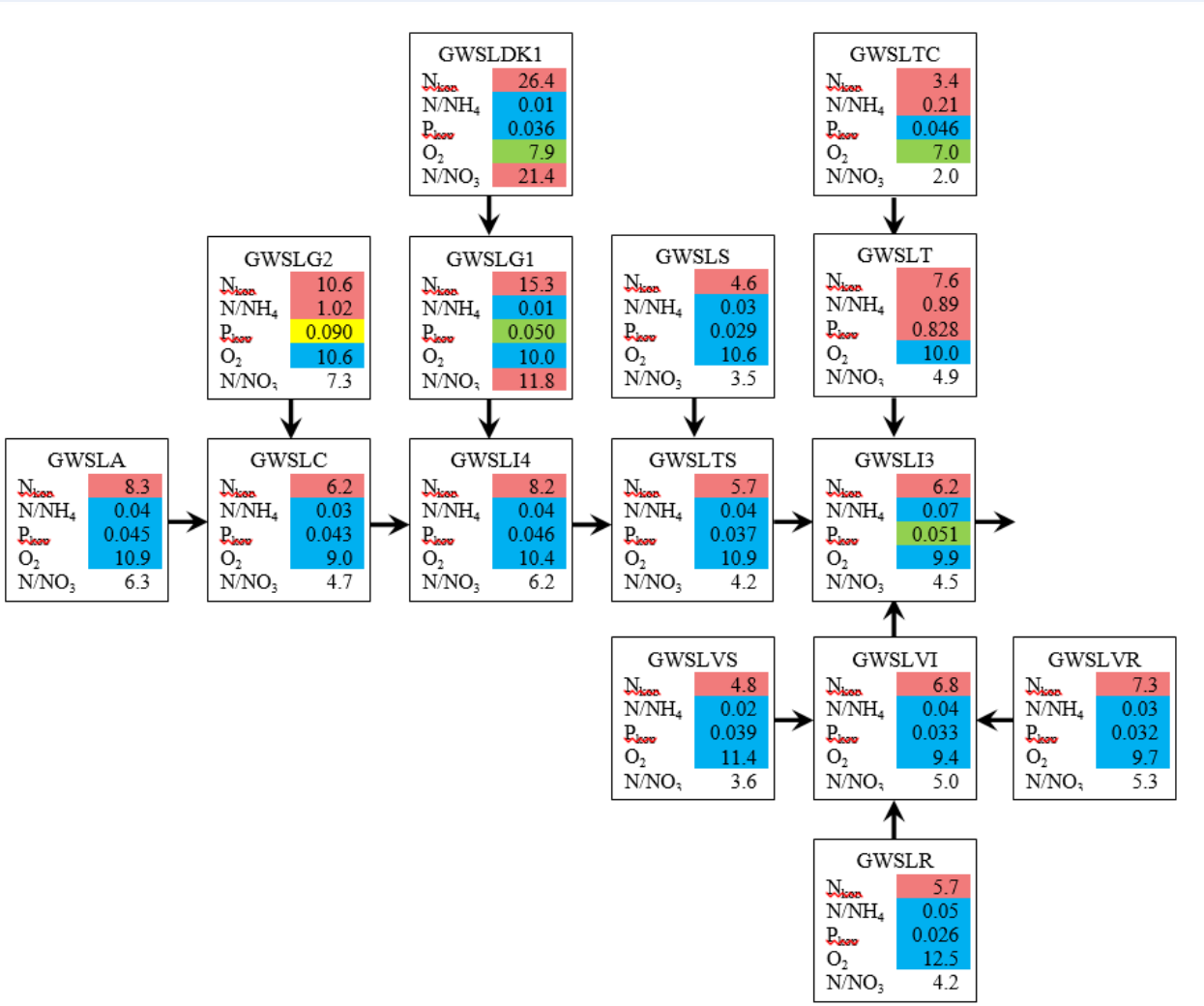
Id	Description of water sampling sites
1	GWAUCR_Rigava River - tributary of the Auce River
2	GWAUCVG_Vecmikelu stream - tributary of the Rigava River
3	GWAUCI_the Auce River - outlet of L118
4	GWAUCK1_the Kalvas stream before a livestock facility
5	GWAUCK2_the Kalvas stream after a livestock facility
6	GWAUCĪ1_the Auce River before the WWTP of Ile village
7	GWAUCG1_ditch in drained agricultural lands 1
8	GWAUCG2_ditch in drained agricultural lands 2
9	GWAUCĪ2_the Auce River after the WWTP of Ile village
10	GWAUCDK_drainage collector in arable lands
11	GWAUCEZ_the upstream part of the Auce River
12	GWAUCBH1_the Auce River before the hydropower plant in Bene village
13	GWAUCB_the Auce River after the WWTP of Bene village
14	GWAUCBH2_the Auce River after the hydropower plant in Bene village
15	GWAUCAR_the Auce River before the Rigava River



High	Good	Moderate	Poor	Bad

The water quality monitoring results at V093 Slocene

Id	Description of water sampling sites
1	GWASLR_Ratnieku stream - tributary of the Vasleja River
2	GWSLVS_Vilnu stream - tributary of the Vasleja River
3	GWSLS_Sudmalupe - tributary of the Slocene River
4	GWSLT_Tumes stream - tributary of the Slocene River
5	GWSLI4_the Slocene River - outlet of V094
6	GWSLVI_the outlet of the Vasleja River
7	GWSLG2_ditch in drained agricultural lands 2
8	GWSLG1_ditch in drained agricultural lands 1
9	GWSLDK1_drainage collector in arable lands
10	GWSLI3_the Slocene River - outlet of V093
11	GWASLVR_the Vasleja River before the Ratnieku stream
12	GWSLC_the Slocene River before a livestock facility
13	GWSLA_the upstream part of the Slocene River
14	GWSLTS_the Slocene River before AS Tukuma Straume
15	GWSLTC_the Tumes stream before the village of Tume



High	Good	Moderate	Poor	Bad

The water quality monitoring results at V046 Ēda

Id	Description of water sampling sites
1	GWEDI2_the Eda River - outlet of V046
2	GWEDI1_the Eda River - outlet of V045
3	GWEDVĀ_Varme - tributary of the Eda River
4	GWEDŪD1_Udrupe - tributary of the Eda River before a livestock facility
5	GWEDGR_Grauzdupe - tributary of the Eda River
6	GWEDPO_Pormale - tributary of the Eda River
7	GWEDVD_Durupe - tributary of the Varme River
8	GWEDVĶ_Kise - tributary of the Varme River
9	GWEDVP_Palice - tributary of the Varme River
10	GWEDJ_the Eda River after the village of Jaunlutrini
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12	GWEDVID_the middle part of the Eda River
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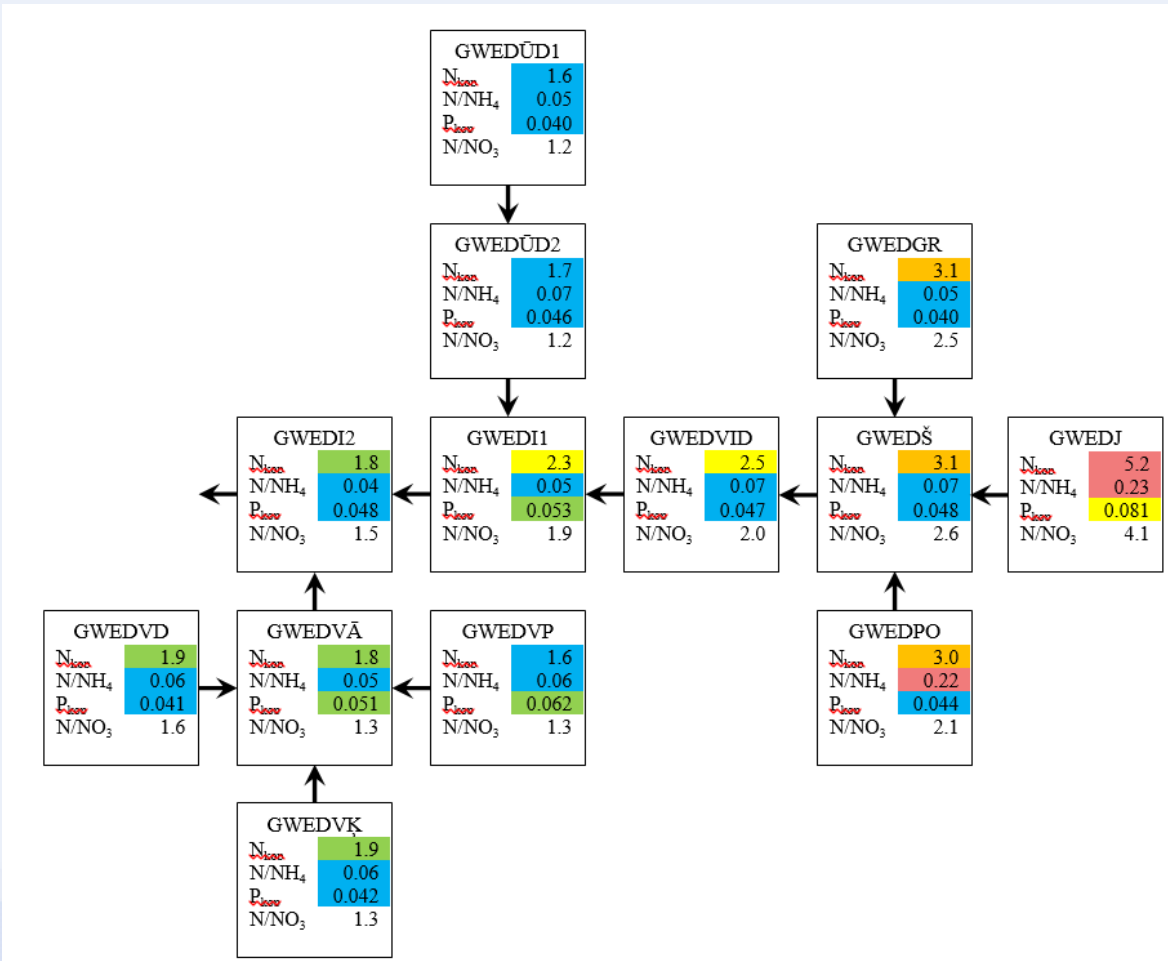
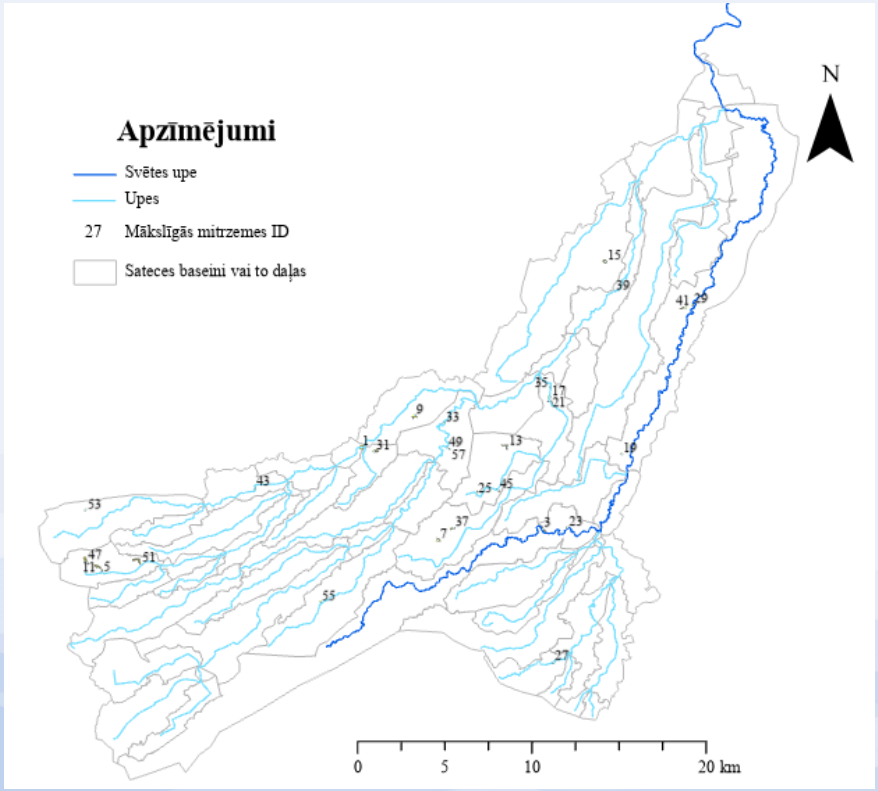
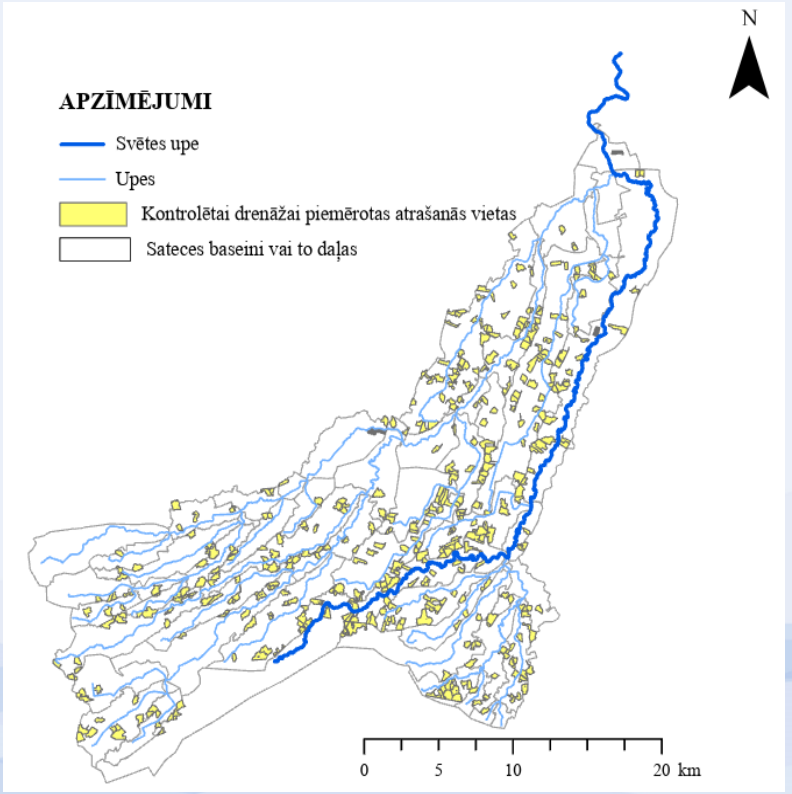


High	Good	Moderate	Poor	Bad

The examples of suitable locations for implementation of sustainable and environmentally friendly drainage systems - the constructed wetland at the Vilcini-1 Farm

Application of the Nutrient Removal Wetlands toolbox of the Agricultural Conservation Planning Framework (ACPF) and sites suitable for controlled drainage and constructed wetlands – master's thesis





Concluding remarks

- ✓ Monitoring is the foundation for determination of water quality and consequently for improvements!
- ✓ Doing the right thing in the right place in terms of planning and implementation of water and nutrient retention measures such as controlled drainage, constructed wetlands, bottom dams, meandering, sedimentation ponds, two-stage ditches, saturated buffers, woodchip bioreactors!
- ✓ Don't forget about 4R principles in nutrient management – right source, right rate, right time, and right place and all other in-field practices such as tillage, catch crops, extended crop rotation, liming and application of gypsum!

Thank you for your attention!

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The integrated project "Implementation of River Basin Management Plans of Latvia towards good surface water status" (LIFE GOODWATER IP, LIFE18 IPE/LV/000014) has received funding from the LIFE Programme of the European Union and the Administration of Latvian Environmental Protection Fund. www.goodwater.lv