

SUCCESS STORY

The renovation of the Sodite stream at Jelgava Local municipality

The catchment area of the Sodite stream consists of agricultural lands in the upstream part and the village of Viesturciems in the downstream part. Overall, 85% of the catchment area is artificially drained with subsurface tile drainage systems and open ditches. During last decades the Sodite stream was not maintained properly to provide good hydraulic conditions for water discharge into the Tervete river. This resulted in overflowing in the main ditch during the spring floods through the years. The Sodite stream was selected as a pilot site for two-stage ditch and constructed wetland implementation and water quality monitoring activities within the NUTRINFLOW project. Due to dense vegetation the water level at the Sodite stream was higher than the outlets of tile systems through the drought periods. The tile drainage systems could not work properly and provide good agro-technical conditions to grow agricultural crops in the adjacent farmlands.

Defined problems for the catchment area of the Sodite stream:

- ❖ Erosion of banks caused by occasional surface runoff events;
- ❖ Nutrient leakage and eutrophication;
- ❖ Not renovated and cleaned since the 1990s.

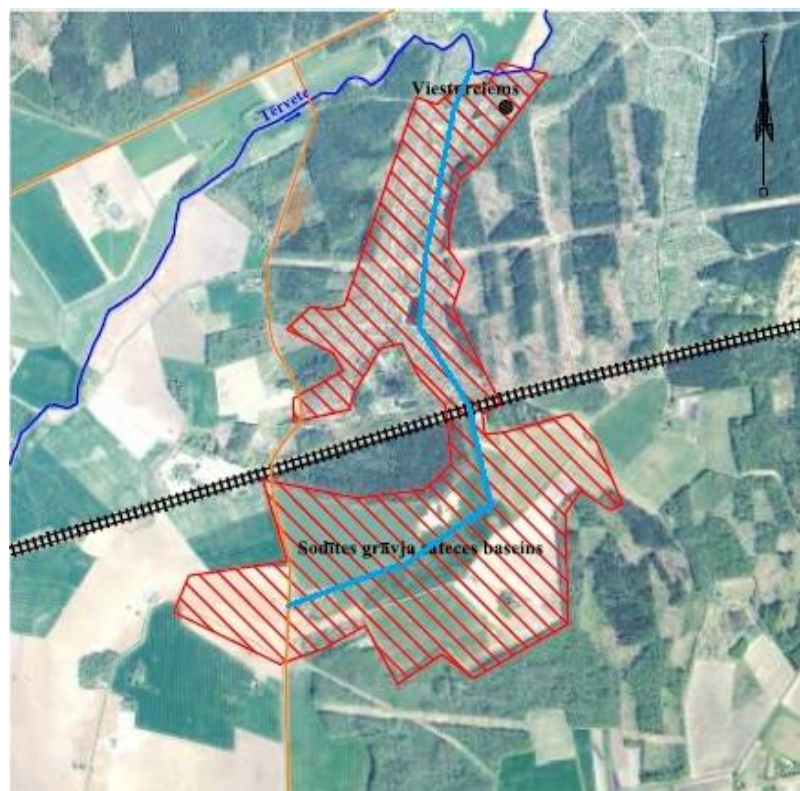


Figure 1. The map of the Sodite stream catchment area.

Holistic water management in the pilot area of the Sodite stream

The main idea of the project for this pilot site was to renovate the Sodite stream in a full length of 3.75 km and transform the cross section of this stream from traditional trapezoidal into two-stage ditch for the first time in such a length in Latvia. Wooden support walls and straw covers were used to prevent erosion of the main channel and flood plain benches. In addition, two monitoring wells were installed for water quality monitoring activities during the project lifetime.



Figure 2. The Sodite stream before renovation (12.11.2015)



Figure 3. The Sodite stream after renovation (14.11.2017)

After the renovation of the Sodite stream the landowners in the catchment area can start to renovate their subsurface tile drainage systems as the main ditch in its current condition is ready to convey water downstream properly. That is the reason why landowners are very satisfied with the project activities. The NUTRINFLOW project allowed the Jelgava Local municipality to involve stakeholders in practical actions to improve their drainage systems. Through practical examples the project provided an insight into how two-stage ditches can be implemented in the rural landscape of the Jelgava Local municipality and elsewhere.

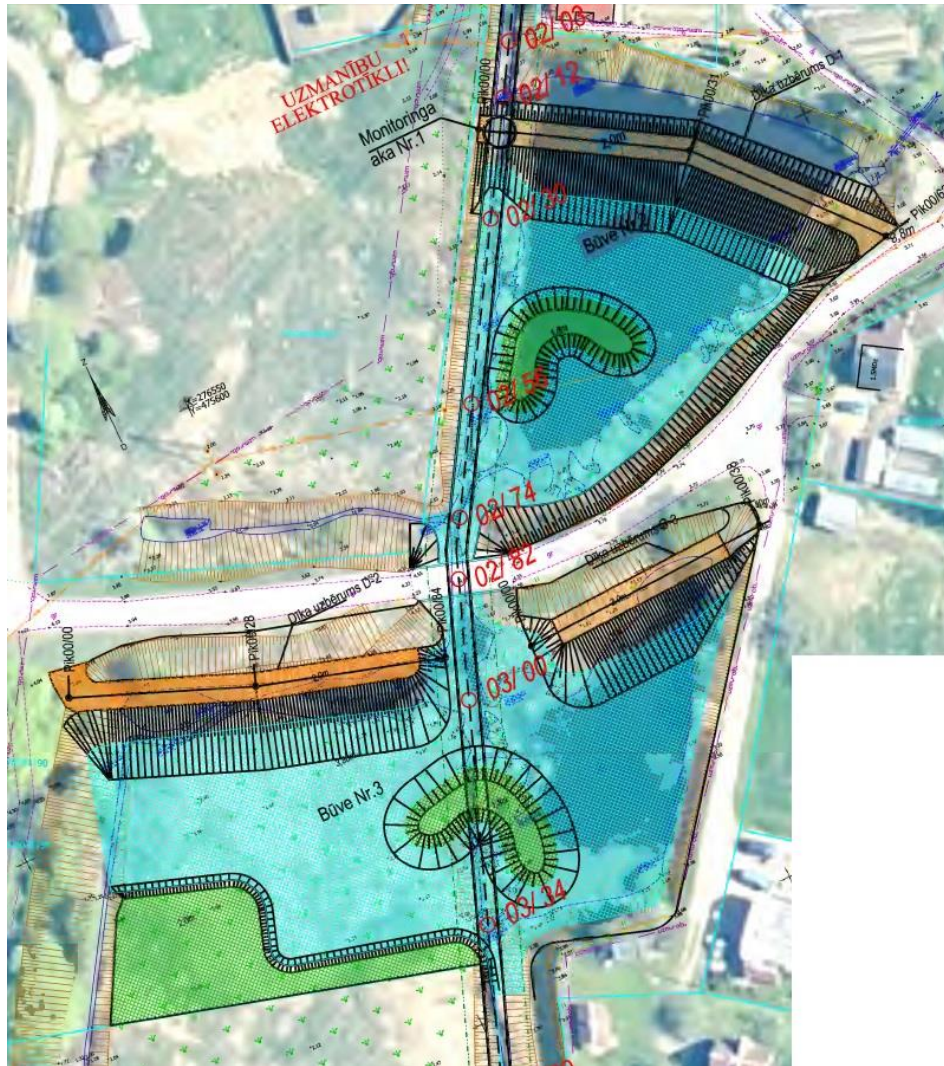


Figure 4. A schematic drawing of the constructed wetland in the downstream part of the Sodite stream

The results of water quality monitoring at the Sodite stream during the project implementation

Water samples were collected twice a month at:

- ❖ Subsurface drain collector (discharge from agricultural fields);
- ❖ Open ditch (discharge from agricultural lands);
- ❖ Before constructed wetland (CW);
- ❖ After constructed wetland (CW).

Water samples were collected at the inlet and outlet of the constructed wetland and at drain collector, open ditch using a manual grab sampling approach. Water samples were analyzed for nitrate-nitrogen ($\text{NO}_3\text{-N}$), ammonium-nitrogen ($\text{NH}_4\text{-N}$), total nitrogen (TN),

orthophosphate-phosphorus ($\text{PO}_4\text{-P}$), total phosphorus (TP) concentration, and total suspended solids (TSS).

Table 1. The monitoring results of the Sodite stream (March, 2018 – September, 2018)

Parameter	pH	$\text{NO}_3\text{-N}$, mg l^{-1}	$\text{NH}_4\text{-N}$, mg l^{-1}	TN, mg l^{-1}	$\text{PO}_4\text{-P}$, mg l^{-1}	TP, mg l^{-1}	TSS, mg l^{-1}
Drain collector	8.02	7.55	0.02	8.27	0.026	0.033	1.97
Open ditch	7.91	3.38	0.05	4.28	0.010	0.023	7.50
Before CW	8.04	1.35	0.06	2.23	0.020	0.033	16.43
After CW	8.06	1.35	0.06	2.27	0.009	0.025	10.82



Legend

- Water sampling sites
- The Sodite stream
- Drain collectors

Figure 5. The water sampling sites at the Sodite stream

Conclusions

The results of the NUTRINFLOW project showed that all measures investigated have a potential to reduce nitrogen, phosphorus and total suspended solids concentrations in drainage water. Two-stage ditch in combination with a constructed wetland may reduce flooding risks downstream. Flow measurements are needed to estimate nutrient mass load and effects of hydrology on nutrient retention.

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