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Catchment area renovation instead of separate actions, success story of Hardombäcken in Loviisa, Finland

On the catchment of river Loviisanjoki was launched NUTRINFLOW-project, aiming to improve the condition of the river with catchment area renovations. The catchment of Hardombäcken was chosen to be the pilot object. It is one of the largest sub-catchments of the Loviisanjoki catchment area. There up to 60-80 hectares (about 20-25 % of the total field area) was suffering on drainage malfunction.

The drainage main channel of Hardombäcken is a typical case, not renovated during decades. The problems consist of small difference of field surfaces and channel water level. By drainage planning norms this difference should be at least 80 cm. This problem was caused by erosion which resulted silt and mud accumulation to the channel and also depression of the soil. Humidity and floods have during the years compressed and weakened soil structure and farming capacity, and also increased depression.

Holistic drainage management pays attention to development potential of agricultural production and environmental protection as multidimensionally as possible. On agricultural fields the holistic drainage approach means functionality of basic and local drainage including also control of surface flows and taking into consideration biodiversity and fishery. On the fields a functional basic drainage enables functionality of local drainage and actions for soil structure improvement. When the soil structure and growing potential are in good condition, this ensures effective crop growing. At the same nutrient outflow and loading to natural water systems can be decreased.

The length of the main channel on Hardombäcken catchment is all together approximately 10 km. The proportion of agricultural fields on the catchment is relatively high, about 50% of the total 12 sq.km catchment is fields under cultivation. In the past there was established a drainage corporative body, with about 40 stakeholders. Initiative of the reconstruction came from the local farmers. The bad condition of the main channel complicated the works of many a farmers, because foods and wetness delayed sowings, hampered harvesting, deceased the crop yields and ruined the soil structure. In the project NUTRINFLOW was composed actions for decreasing nutrient outflow, improvement soil structure and growing potential on the Hardombäcken sub-catchment.

Even if all the farmers did not suffer of wetness and floods, the decision to take the actions was done unanimously and without problems in the drainage corporative body. The corporative enabled the wide range implementation. The last renovation of Hardombäcken was done nearly 60 years ago. Separate renovations was done, but the effectivity of these actions was poor. In many cases the drainage corporations are dormant and they must be awakened again for taking the responsibility on the functionality of the basic drainage of the region.

Introduction of different drainage management measures to the farmers is easy, when the problems can be addressed. Most of the farmer have a strong motivation to renovate their fields or local waterbodies. Quite often the farmers recognize the problems, but cannot spontaneously find their resolutions. Most of the drainage corporatives are not active and drainage stewards have not been nominated. This causes delay of renovation and separate stakeholder find the



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restart difficult, because they do not know, to whom they should contact. This is why the stakeholders try to renovate short proportions of the channel on their property, and the results are not desirable. Renovation made by local part-time contractors together with the land owners give mainly bad quality results.

A great challenge is that every drainage system or catchment cannot use the same action plan, but the actions should be targeted to every object individually. Land use and topography set limitations which must be taken into consideration. In the large scale this causes several uncertainties and exact objectives or limit values cannot be set. According to our experience the best way to promote the actions are direct connections with some of the farmers or land owners of the problematic ground. These problematic grounds can be easily defined with preliminary studies from avia photo, soil type data, topographic height models and erosion models.

At the Hardombäcken catchment was renovated about 10 km of the main channel, resulting water level decline up to 1,2 m. Prior to the renovation trees and bushes were cut off and to the downstream was built 100 m long flood plain section and two large sedimentation pond with bottom dams in order to catch the loading caused by the excavations. The last downstream section, 240 meters of meandering creek was left untouched. This was possible, because the field levels were sufficiently high above the water level. This downstream section might most possible be a habitat of sea trout, because the river Loviisanjoki has a natural sea trout population.

Upstream was constructed 300 m long flood plain for better drainage of the lowest fields and for improvement of biodiversity. Water protection constructions were placed to waste land sections of the fields. Connected with the renovation was built three new culvers and renovated three old ones. The old culverts were damming the water flow, and after renewal the water level declined up to 80 cm. 658 m of open ditches flowing to Hardombäcken was transformed to subsurface tube channels.

When the basic drainage was set into condition, it was possible to renovate the field plots which were suffering of wetness. Subsurface drainage was constructed to 21 hectares, of which 13 ha was new drainage and 8 ha supplementary drainage. Soil improvement substrates was spread to 180 ha of fields. Structural lime (Nordkalk Fostop) was spread 89 tn to 20 hectares and calcite (Nordkalk) 810 to 115 ha. Zero fiber of pulp industry (Soilfood) was spread total 1635 tn for better micro fauna and cultivation properties of soil. During the project was also constructed a 1,3 hectares multifunctional wetland to upstream of Loviisanjoki (Rutumi, Lapinjärvi).

The landowners of the region have been very gratified with the results of the project. Systematic and step by step implementation on catchment area scale, from field to waterbody probably guarantees the best possible result for drainage and soil structure improvement and minimization of nutrient inflow to waterbodies. When the renovation needs of drainage systems are massive, we should aim to avoid unsystematic implementation without planning. When a national scale renovations are made properly, it is not only an issue of drainage management and environmental aspects of separate field plots, but also increase of land value and gross national production, carbon strapping, environmental education and maintenance of infrastructure.

NUTRINFLOW was an international project, where the Finnish pilot region was the catchment of river Loviisanjoki. The main objectives of the project were improvement of agricultural field production and water conservation with assistance of the pilot objects. The project was financed by Central Baltic Interreg program (European Regional Development Fund, ERDF). Even if the



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project had investment financing in the budget, the landowners were due to their own contributions. The project was implemented 1.9. 2015 – 28.2. 2019. The lead partner was ProAgria Southern Finland, the Finnish partners were Nylands Svenska Lantbrukssällskap and city of Loviisa. The contractors for Hardombäcken renovation, Rutumi wetland construction and sub-surface drainage improvements were Kaivinkoneyhtymä Lindholm Oy and Rantala Timber Oy.

In Latvia the partners were Farmers Parliament, Jelgava Local Municipality, Latvian University of Life Sciences and Technology and Zemgale Planning Region. The pilot objects in Latvia were Sodite stream and Ailes stream.

In Sweden the partners were JTI (Jordbrukstekniska Institutet), recently RISE and Östergötland County Administration (CAB) and an associate partner Vreta Kluster. JTI was leading the Innovation work package and CAB promoted drainage management measures in their region.

As a whole, NUTRINFLOW-project can be also considered as a success story of international expert cooperation. The diversity of the project partners, different standpoints, different administrative practices and different experiences combined with similar overall rules of EU and CAB, similar problems with land drainage, similarity of nature conditions on the shore of the same Baltic Sea. This all gave a fruitful basis for expert dialogues!



Pic.1 A bottom dam, allowing fish migration



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Pic. 2 A two-stage ditch, with one sided flood plain



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Pic. 3 Local sub surface drainage installation after renovation of the basic drainage