

## NETHERLANDS

### Soil erosion & soil management

#### Location

Haarloseveld and Olden Eibergen

#### Programming period

2014 – 2020

#### Priority

P4 – Ecosystems management

#### Measure

M4 – Investments in physical assets

#### Funding (EUR)

Total budget 180 000  
RDP 90 000  
Other 90 000

#### Project duration

2017 – 2020

#### Project promoter

Stichting Marke Haarloseveld Olden Eibergen en omstreken

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Incorporating locally available biomass into the soil, as a mean to increase its content in organic matter in the long term.

### Summary

More than 200 hectares of barren sandy soils can be found in the Haarloseveld Olden Eibergen (Gelderland). The decline of organic matter content comes at the expense of agricultural production and soil fertility. The water system, soil quality and the consequences of climate change call for sustainable solutions.



In order to reverse this trend, a practice proposed is to incorporate biomass from the surrounding environment into the soil, helping to make its organic matter content more stable. RDP support financed a series of activities, including research on the different types of biomass that can be used, a survey on the availability of local biomass supply, discussions with farmers, and the development of a feasibility study.

### Results

It is expected that 30 years of incorporating local biomass in the soil from the surrounding environment will lead to 2% more effective organic matter in plots with grassland and maize rotation, and up to 10% in fields with root vegetables (potatoes, beets).

Interviews with participating farmers show that the organic matter content of the soil in their land has remained stable, or slightly increased. The carrying capacity of soils has also increased.

The water retention in soils with a light texture and in sandy soils seems to be improving. There are indications that the leaching of nutrients to groundwater has decreased.

### Lessons & Recommendations

- ❑ Strict laws and regulations apply to the use of biomass in the soil from the immediate vicinity and they need to be considered before starting such an initiative.
- ❑ The project's approach can stimulate cooperation between farmers and other actors in the area, through the production of biomass and the protection of groundwater quality.
- ❑ The time between the submission of the project proposal and approval is too long. This can result in further development of the project stagnating.

### Context

The decrease of organic matter in the soil of some agricultural parcels in the Haarloseveld and Olden Eibergen areas of Gelderland province is detrimental to farms and the soil. According to some farmers, agricultural plots in the area have lost 4% to 5% of their organic matter in the past 10 years. This has caused agricultural yields to deteriorate. It also affects the ability of the soil to retain water, nutrients and pesticides. Soil degradation is expected to lead to farms spending more on fertilisers, pesticides, irrigation and the treatment of manure. In the Netherlands, the leaching of nitrate is considered a threat to soil and groundwater quality, especially in areas where drinking water is extracted from groundwater, such as in Haarloseveld and Olden Eibergen. This may increase the cost of drinking water.

The incorporation of biomass from the surrounding environment into the soil is seen as a practice that helps to get more organic matter in the soil, and to make the organic matter it contains more stable. In order to promote this practice, farms, contractors and residents have organised themselves into the HOEduurzaam Foundation. The foundation focuses on sustainable agriculture and the improvement of soil quality in the Haarloseveld and Olden Eibergen ('HOE'). The drinking water company Vitens, which has two water catchment areas in the region, also encourages this kind of action. Spreading this practice will improve the infiltration and retention of rainwater, and thus reduce the negative effects of drought and flooding on crop production.

### Objectives

The objective of this project is to reverse soil deterioration in the Haarloseveld and Olden Eibergen, by using biomass to increase soil organic matter and thus ensure environmental protection and sustainable agriculture.

### Activities

Activities supported include:

- research into the different types of biomass that can be used according to current laws and regulations;
- Assessing the types and quantities of biomass in the area that can be used;
- interviewing potential suppliers of biomass to get an overview of the type and amount that they can provide;



- organising kitchen table discussions with about 20 farmers, who own farms of 75 - 150 ha. These will explore their willingness to include biomass in their cultivation plan. Discussions will be held annually to adapt cultivation plans on the processing of biomass;
- evaluating the different forms of biomass that are used to increase the content of organic substances. This will provide up-to-date insight into the practical use of biomass for producers and consumers (farmers).
- supporting research on the reduction of CO2 emissions resulting from the use of local biomass. This will provide an understanding on how this practice contributes to climate change mitigation and the circular economy;
- establishing different scenarios for practical research into the possible applications of biomass on farms. This will give insights into potential uses on farms;
- developing a model to calculate the costs and revenues for the use of local biomass;
- acquiring the necessary authorisations to use the biomass. Establishing contractual agreements with biomass suppliers and users; and
- carrying out a feasibility study and preparing a report on the amount of biomass to be used and its effects on soil and groundwater. This will provide sufficient data about the quantities of biomass per hectare that are supplied and its impact. The results will be processed in such a way that the method can be applied elsewhere.

## Main results

Farmers have noticed that working with biomass from the immediate environment has improved the aeration and structure of the soil. They have even observed an increase in crop yields. When wood chips were used, these effects occurred after only two years.

It is expected that after 30 years the processing of biomass from the direct environment will lead to 2% more effective organic matter in plots with grassland and maize rotation, and up to 10% in fields with root vegetables (e.g. potatoes, beets).

There will also be more replenishment of the groundwater due to rainwater as infiltration in the topsoil will improve.

It is anticipated that undesirable substances such as nitrates, pesticides and veterinary medicines in the groundwater will be better broken down in the topsoil.

However, until now there are no observations from test farms, or from the parties monitoring the water quality in the area confirming the expected results. The approach started recently and there is no direct evidence from the area itself yet.

Interviews with four farmers have shown that the organic matter content of the soil has remained stable or slightly increased, and that the carrying capacity of the soil has increased as well.

Water retention in soils with a light texture and in sandy soils seems to be improving and there are indications that the leaching of nutrients to groundwater has decreased.

The results of a monitoring campaign by the drinking water company Vitens have shown that the average nitrate concentration in the upper groundwater in the area, fell below the EU standard of 50 mg / l between 2014 and 2016, but in 2017 the concentration increased again.

## Key lessons

Disadvantages of this practice are threefold: firstly, the heavy machinery needed to incorporate the biomass can cause damage to the soil through compaction; secondly,, there can be substances harmful to human and animal health in the biomass; finally, it can cause acidification of the soil and more weeds.

Strict laws and regulations apply to the use of biomass in the soil from the immediate vicinity. This applies in particular to biomass originating from roadside verges.

Farmers are worried about the obligation to include the use of biomass in fertiliser and mineral accounting, as an additional source of nitrate and phosphorus. Mixing manure with local biomass would result in a better quality soil improver, but because the complete mixture must be counted as a manure feed for the farm, this is an obstacle for farmers.

Vegetable remains from farms in the immediate vicinity are reused as an alternative fertiliser. As a result, the practice contributes to the closing of cycles of production and residual flows.

The approach can stimulate cooperation between farmers and other local actors through the production of biomass and the protection of groundwater quality. This promotes social cohesion in the area, and there is greater awareness of the role that soil plays in providing ecosystem services.

The experience of the project applicant is that as a foundation, it is impossible to pre-finance the incoming invoices up to the basic amount of €50 000, or 35% of the allocated subsidy. The time between the submission of the project proposal and approval is too long. This can cause any further development of the project to stagnate.

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## Additional sources of information

n/a