RESTORED RIPARIAN WETLANDS

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Description
Restoration of riparian wetlands is conducted on low-lying often former organic soils that at some time in recent history were drained mostly for agricultural production purposes. They are 'man-made' natural wetlands as they are created on areas where the physical and chemical composition of the soils has been changed due to many years of draining and farming.

Rationale, mechanism of action
Restored wetlands are in most cases established with the principal aim to retain nutrients lost from agricultural fields in the catchment through processes like denitrification, sedimentation and sorption. The restored wetland is established as groundwater or surface water wetlands adjacent to streams and rivers or as estuarine wetlands along the coast line. Nitrate-N from adjacent agricultural fields leaching to groundwater will in restored groundwater dominated wetlands often meet an anaerobic zone where denitrification can take place and an uptake by vegetation of both inorganic N and P will happen. Surface water dominated wetlands will receive both dissolved and particulate bound nitrogen and phosphorus forms that can be retained through physical processes as sedimentation and biogeochemical processes such as denitrification, sorption and biological uptake [1,2,3,4].

Applicability
The measure can be used in riparian areas where a former wetland was situated but now being drained via ditches, tile drainage, pumping or simply channelization of watercourses. Restoration of the former wetland takes that the area is bought from the farmers or an interchange is done with the farmer giving him new land for the one being restored. In pumped areas the pumps are simply shut down and groundwater table will rise. In surface water wetlands the watercourse is restored or the stream bed elevated and existing ditches and tile drains is cut so both groundwater table and surface water table is increased. Periods of inundation and flooding will increase after the restoration as compared to the period before.

Effectiveness, including certainty
The effectiveness of restored wetlands for reducing nitrate, sedimentation of P or uptake of nutrients in vegetation is normally high. Experience from Denmark with restored riparian wetlands show a nitrogen retention capacity of around 200 kg N per hectare restored wetland with increasing performance with increasing loads and residence time [5]. Experience with sedimentation of P also shows that restored surface water wetlands have a high retention capacity of 10-100 kg P per hectare inundated wetland [2]. However, the P retention is more certain for particulate P than for dissolved P as some restored riparian wetlands experiences a net leakage of dissolved P due to pools of former agricultural P in soils combined with anaerobic conditions [2].

Time frame
Effects of establishing restored wetlands will increase as vegetation cover increase but for N and particulate P retention the effect will appear immediately.

Environmental side effects
Restored surface water wetlands will also capture or degrade other substances and organic carbon, sediment, iron, pesticides, heavy metals, etc. coming with river water into the wetland. The wetland may also have effects on pesticide degradation and emission of green house gases.

Relevance, potential for targeting, administrative handling, control
Restored wetlands can be used where low-lying areas were formerly drained and where the soil surface has lowered due to mineralization of peat layers and physical shrinking. As many restored wetlands includes a lot of land owners the administrative handling and project planning can take a long time. One example from Denmark is the restoration of ca. 2000 ha of low-lying areas around the river Skjern which took nearly 25 years to accomplish from the day the Danish Parliament decided to restore the river and wetland [xx].

Costs: investments, labor
The costs of this option relates to the costs of: (1) establishing the project proposal, (2) getting hold of the land to become a new wetland eventually through buying up or swopping land with farmers, (3) establishing the restored wetland, and (4) maintenance in the form of grazing, etc.

References

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