

MITIGATION MEASURES FOR IMPROVEMENT OF AGRICULTURAL DRAINAGE WATER AND SURFACE WATER QUALITY IN DENMARK

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IMPLEMENTATION OF NUTRIENT TRANSPORT MITIGATION MEASURES TARGETING AGRICULTURAL NUTRIENT LOSSES TO FRESH AND MARINE WATER IN DK

- In 2016 the Agricultural Package was adopted by the Danish Parliament and Danish farmers were again allowed to fertilise their crops to economic optimum.
- To compensate for the consequent increase in fertilisation rates
 - A nitrogen (N) and phosphorus (P) management plan was introduced
 - Measures to mitigate N losses in smaller catchments ($\approx 15 \text{ km}^2$)
 - A series of nutrient transport mitigation measures has been scientifically approved for use in this new regulation

Restoration of riparian wetlands

Lowland fens and swamps

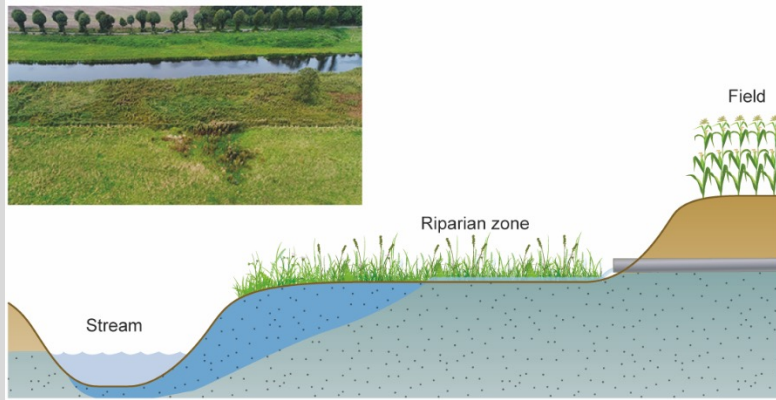
Re-establishment of shallow lakes,

Constructed wetlands (surface flow and subsurface flow)

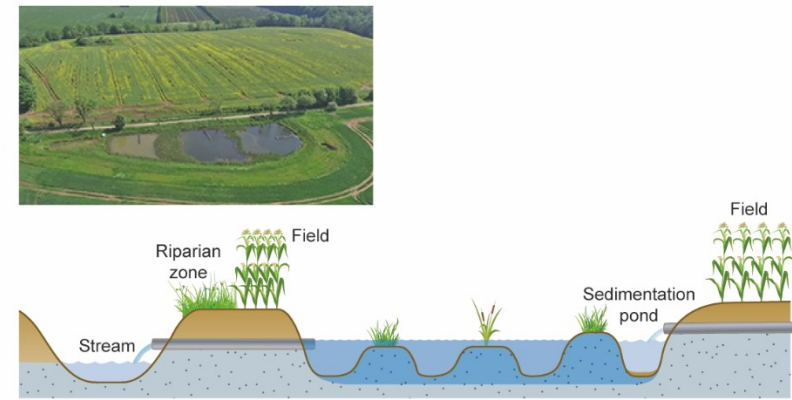
Not yet approved

Integrated buffer zones, Saturated buffer zones and Controlled drainage.

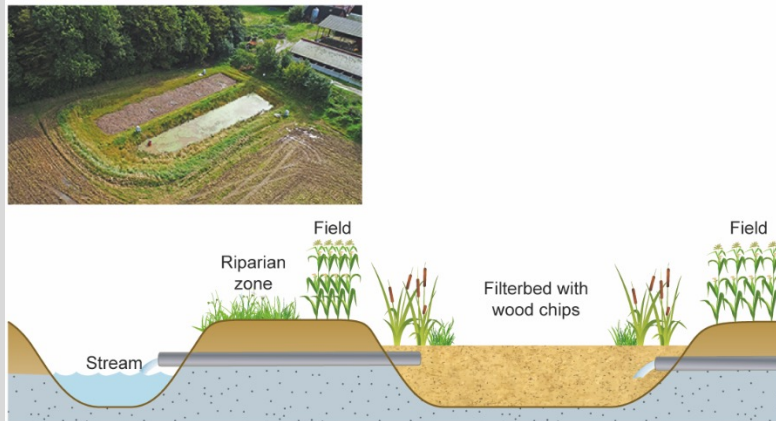
A) Drain water irrigation



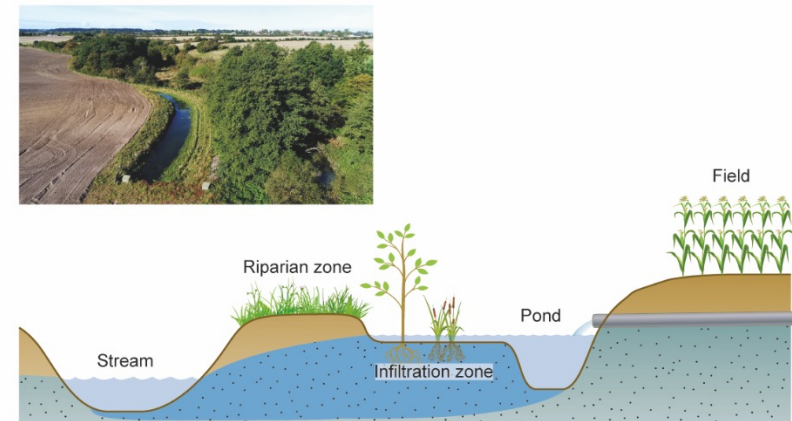
B) Surface flow constructed wetland



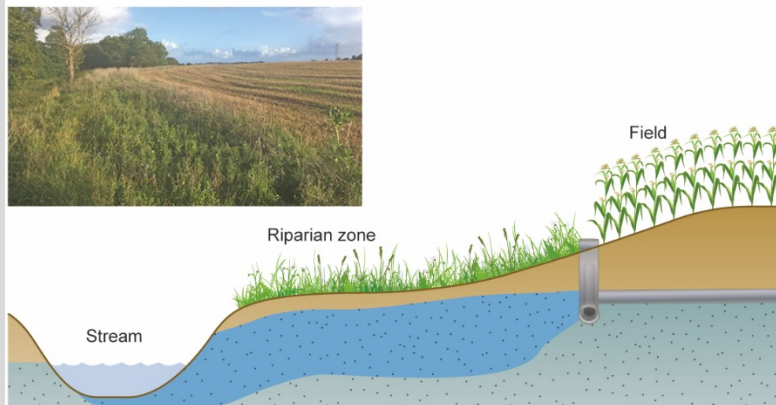
C) Subsurface flow constructed wetland



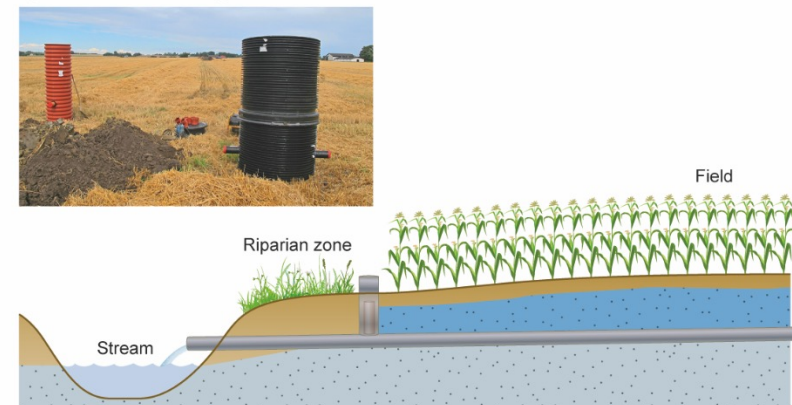
D) Integrated buffer zone



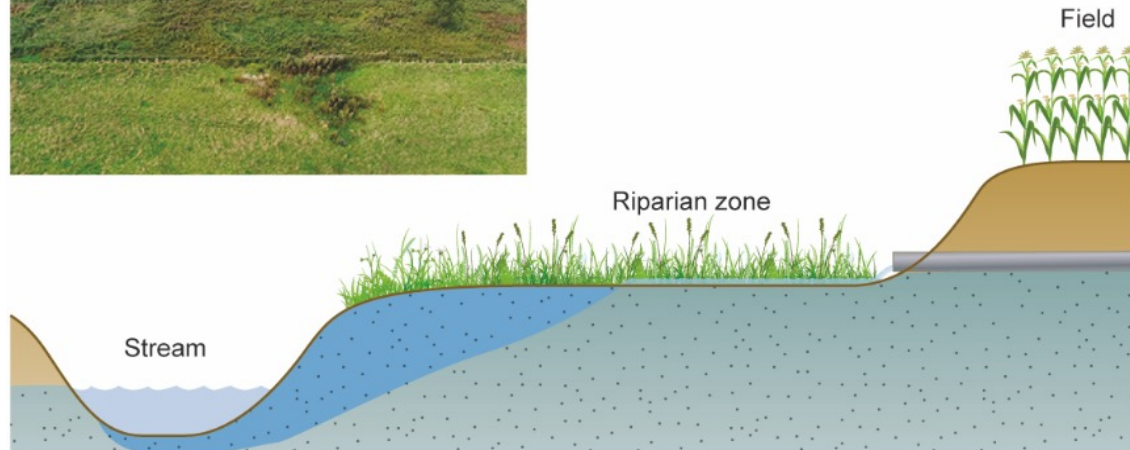
E) Saturated buffer zone



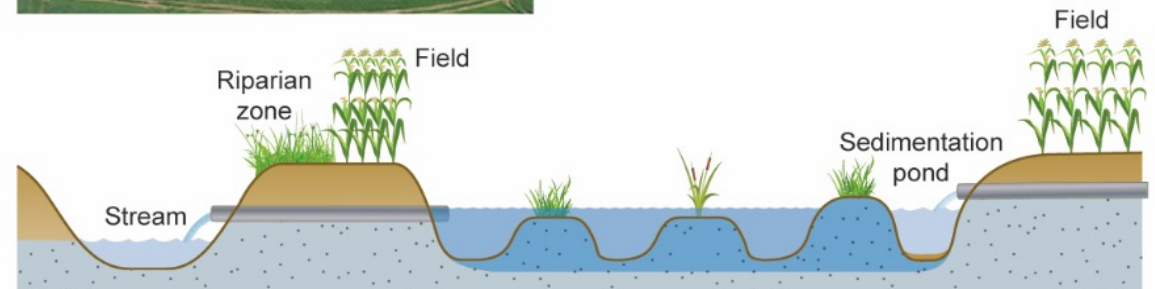
F) Controlled drainage



A) Drain water irrigation



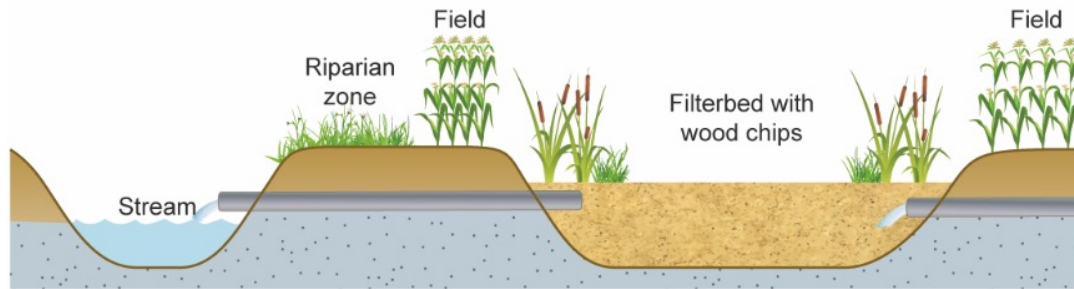
B) Surface flow constructed wetland



Removal rate		Removal efficiency	
(kg ha ⁻¹ y ⁻¹ / ^b g m ⁻³ y ⁻¹)		[%]	
TN	TP	TN	TP
139±91	-0.3±0.3	45±22	-51±49

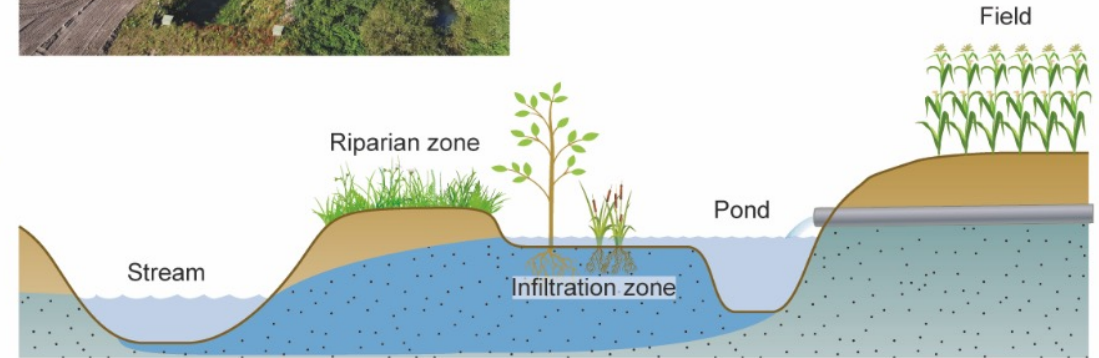
Removal rate		Removal efficiency	
(kg ha ⁻¹ y ⁻¹ / ^b g m ⁻³ y ⁻¹)		[%]	
TN	TP	TN	TP
472±372	31±26	23±10	45±20

C) Subsurface flow constructed wetland



Removal rate		Removal efficiency	
(kg ha ⁻¹ y ⁻¹ / ^b g m ⁻³ y ⁻¹)		(%)	
TN	TP	TN	TP
7771±241	34±6	50±13	12±4
^b572±290	^b 3±1		

D) Integrated buffer zone



Removal rate		Removal efficiency	
(kg ha ⁻¹ y ⁻¹ / ^b g m ⁻³ y ⁻¹)		(%)	
TN	TP	TN	TP
1661±605	17±15	45±12	29±60

Controlled drainage	TN kg/ha	TP kg/ha	TN %	TP %
	8.8±6.5	2.2±2.4	33±13	5±29

Thank you for your attention



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