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DEPARTMENT OF AGROECOLOGY

Interreg
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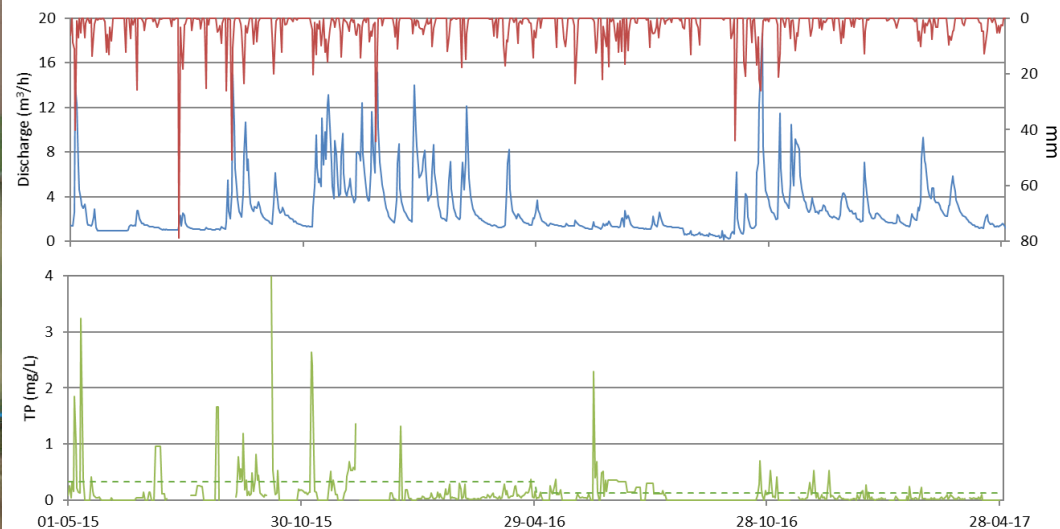
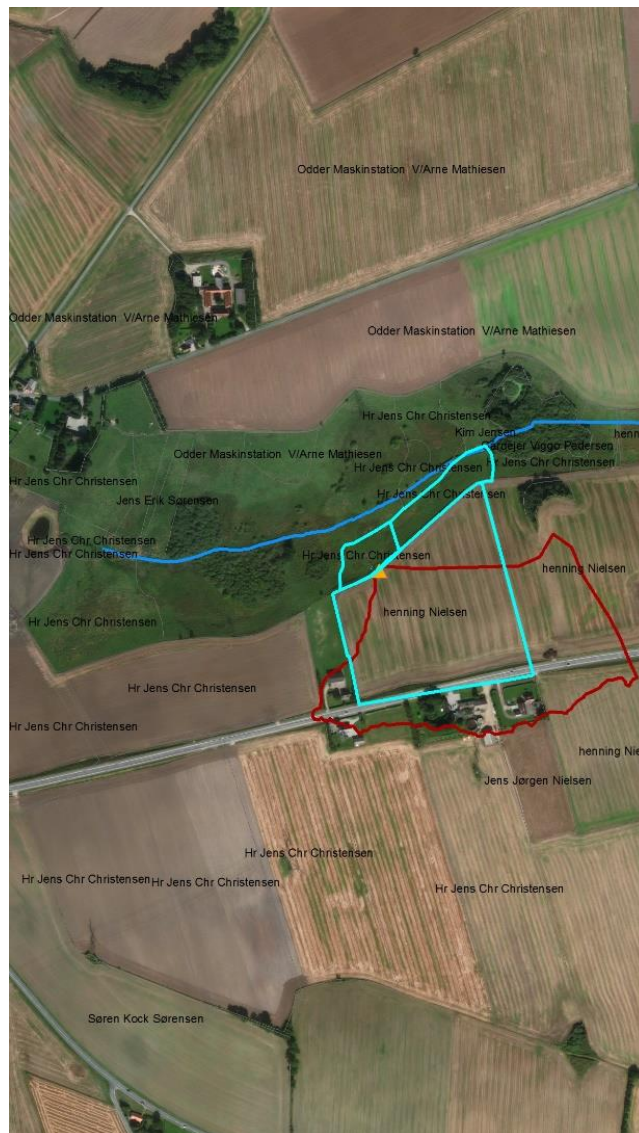
STØTTET AF

Promilleafgiftsfonden for landbrug

**Sediment and reactive filter
to remove particulate and dissolved phosphates:
case study Denmark**

Lorenzo Pugliese
Goswin Johann Heckrath

Fensholt D8



May 2015/16	Catchment area (ha)	8.4
	Q (mm)	349
	Q/P (-)	0.30
	TP (kg/ha)	1.1
	Flow weighted average TP (mg/L)	0.32
May 2016/17	Q (mm)	246
	Q/P (-)	0.28
	TP (kg/ha)	0.3
	Flow weighted average TP (mg/L)	0.13

System design

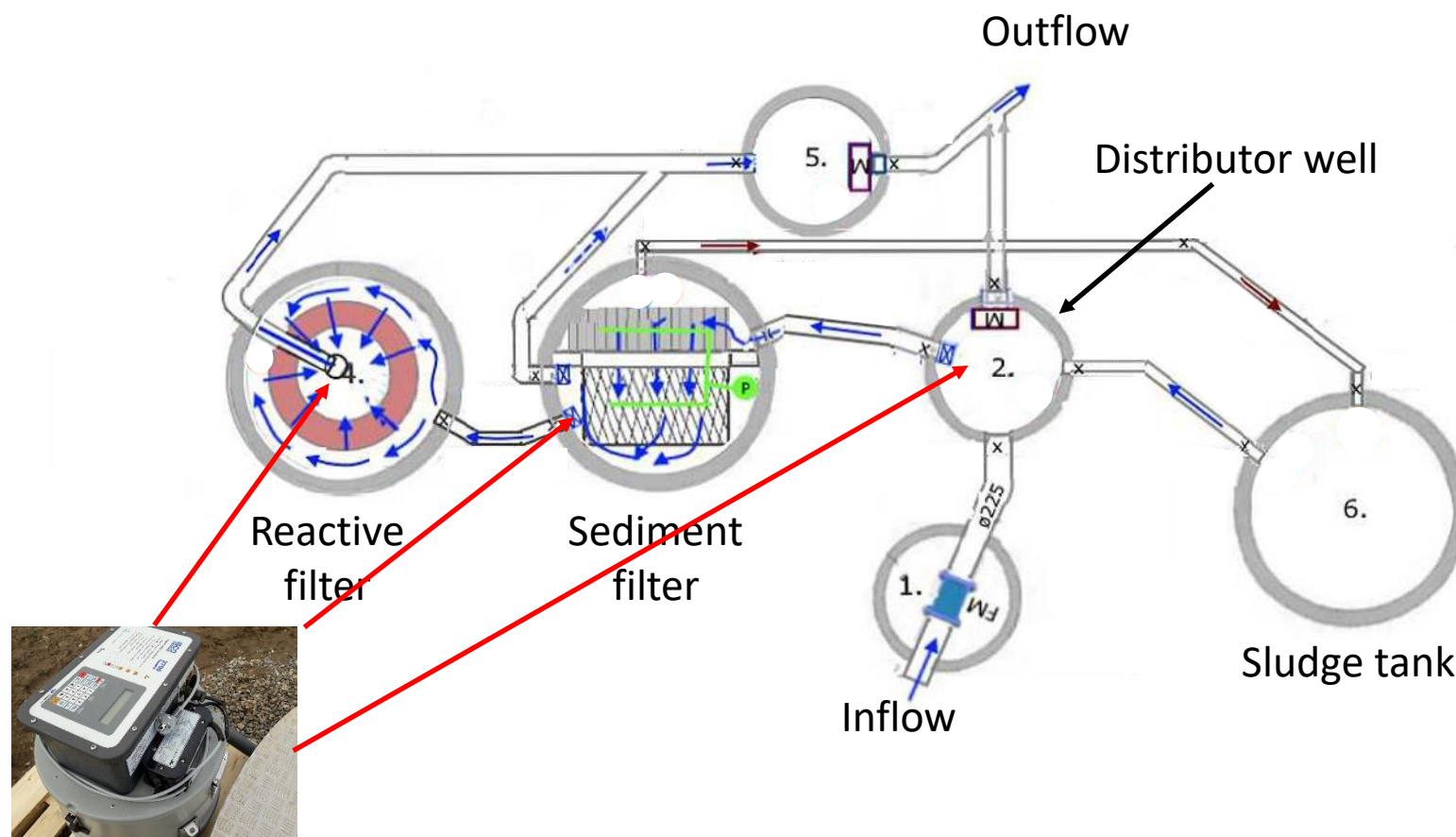
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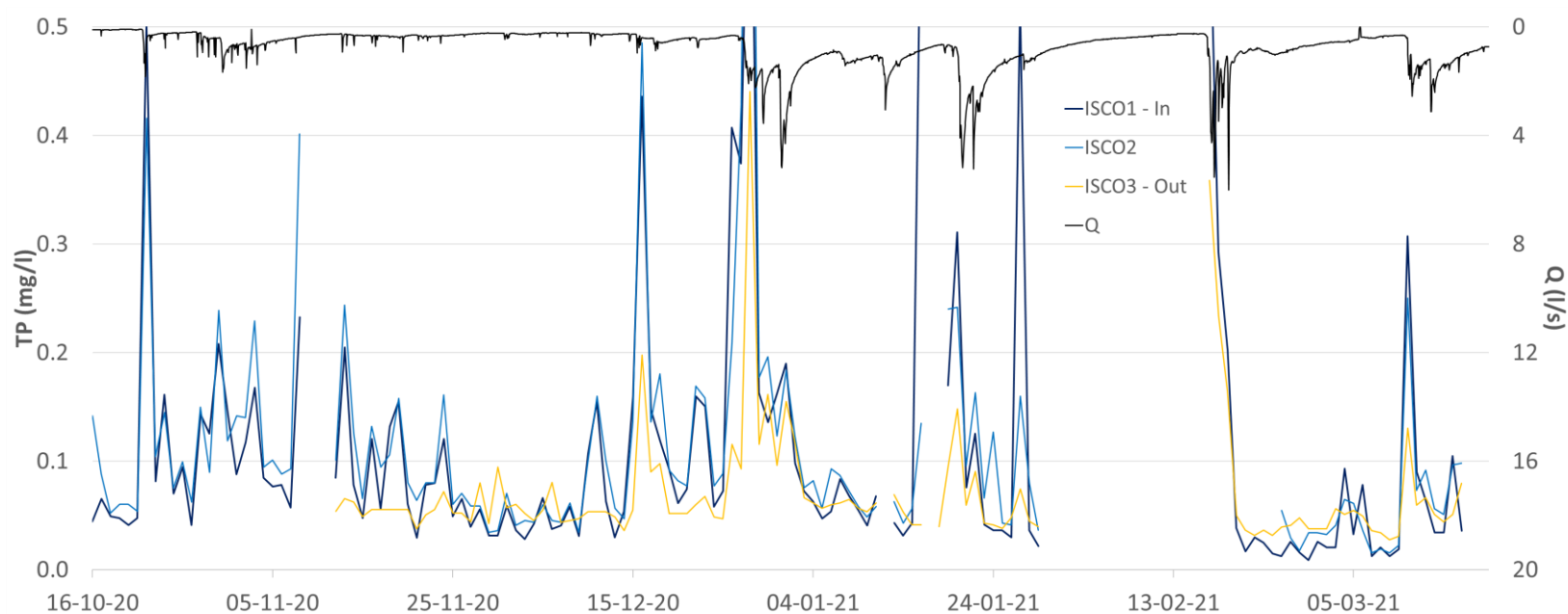
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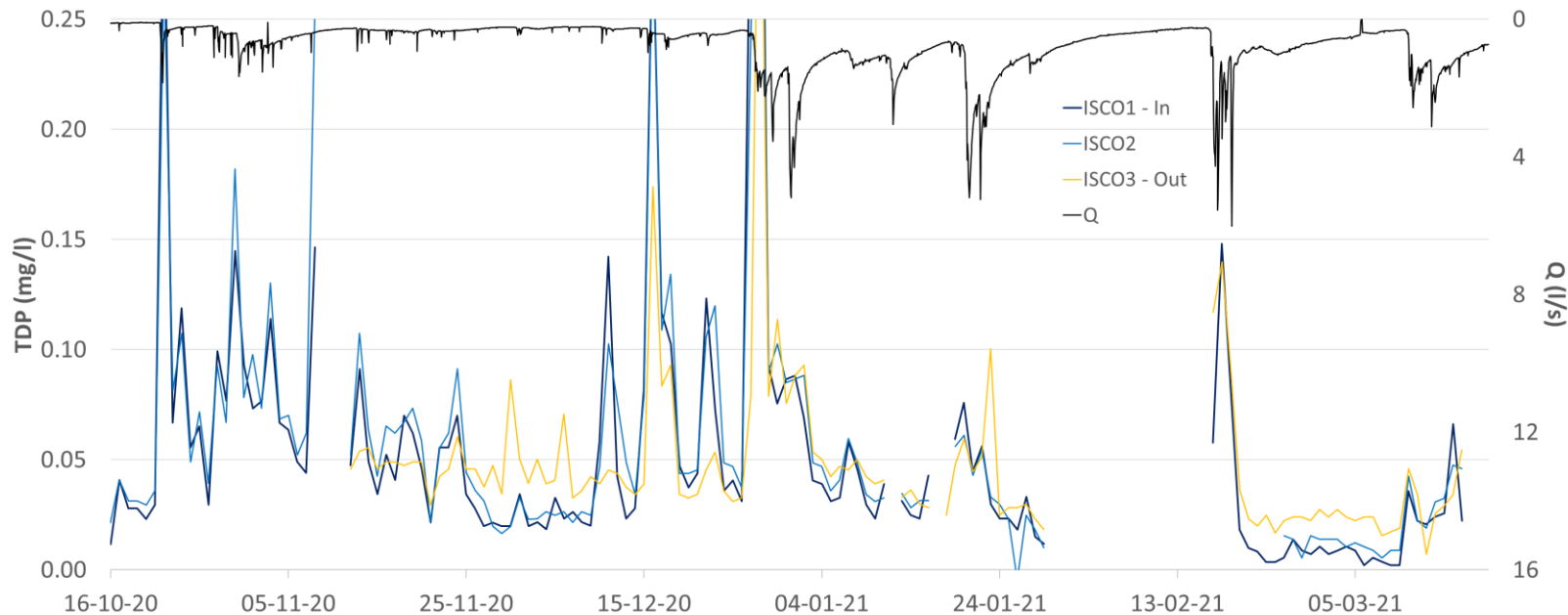
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TP – Fensholt D8



TDP – Fensholt D8



Monthly data overview



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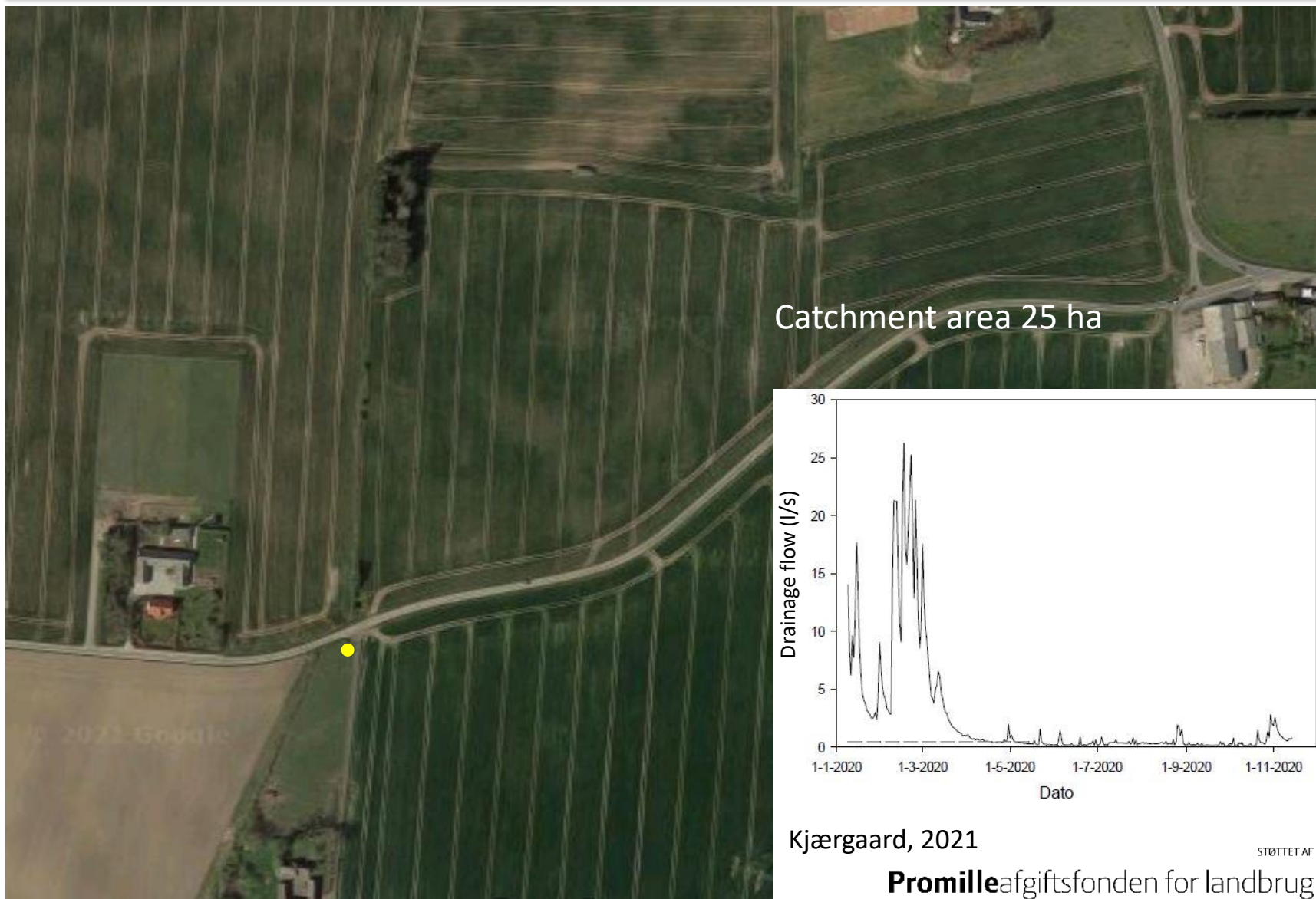


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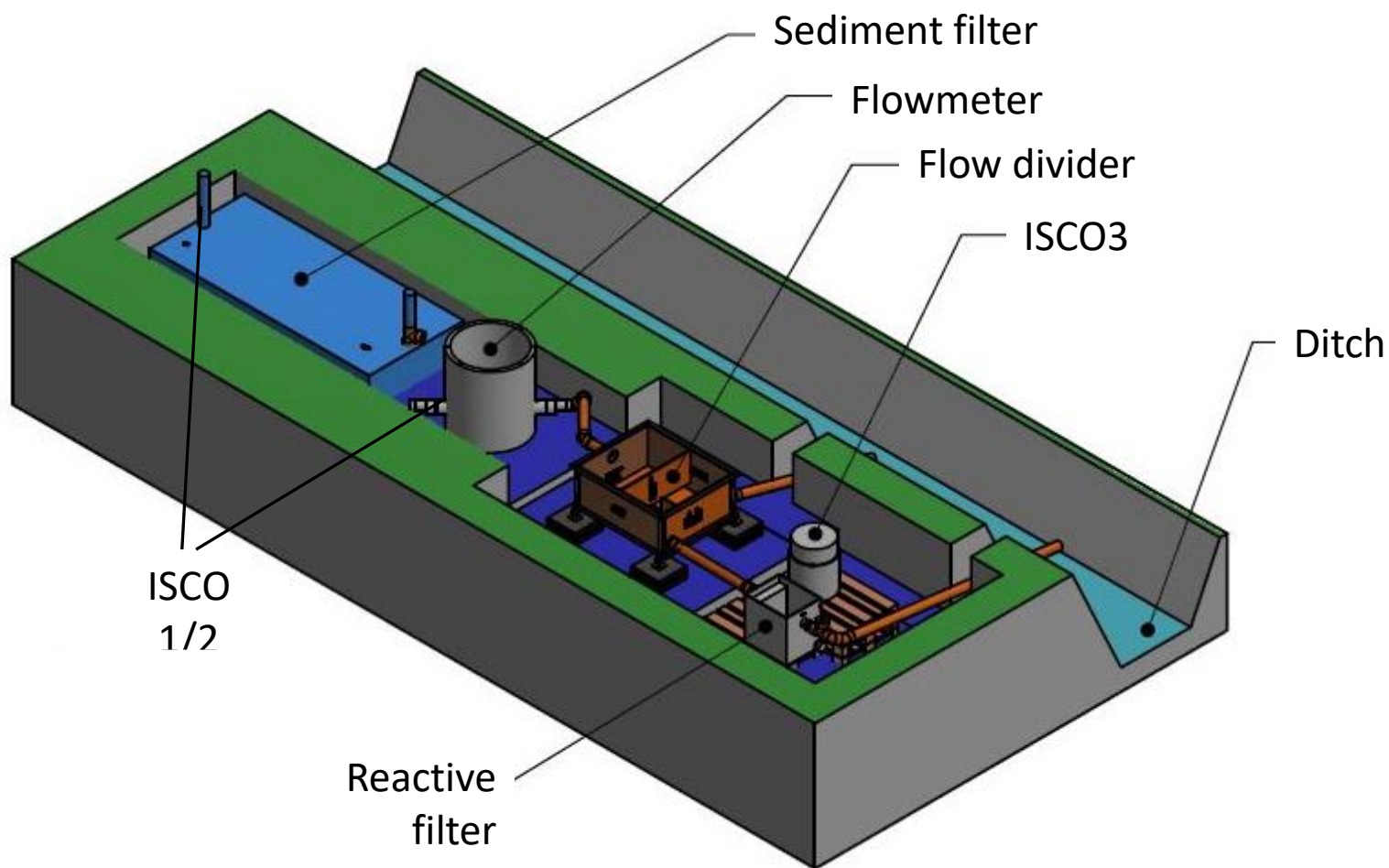
Month	Q (m ³)	Sediment filter				Reactive filter (Diapure)				Overall system
		TP load (g)	TP removal (%)	TDP load (g)	TDP removal (%)	TP load (g)	TP removal (%)	TDP load (g)	TDP removal (%)	TP removal (%)
okt-20	645	67	-24	44	-11	66		45		
nov-20	997	87	-30	55	-19	113	23	66	-21	5
dec-20	1630	339	-14	208	-13	395	27	197	-2	16
jan-21	3651	394	-29	141	-2	354	21	141	10	0
feb-21	1815	259	-164	59	-66	15	-50	4	-125	-87
mar-21	2007	101	-32	29	-90	105	-12	33	-67	-47

Incomplete monthly data

Fensholt D3



System design



TP – Fensholt D3

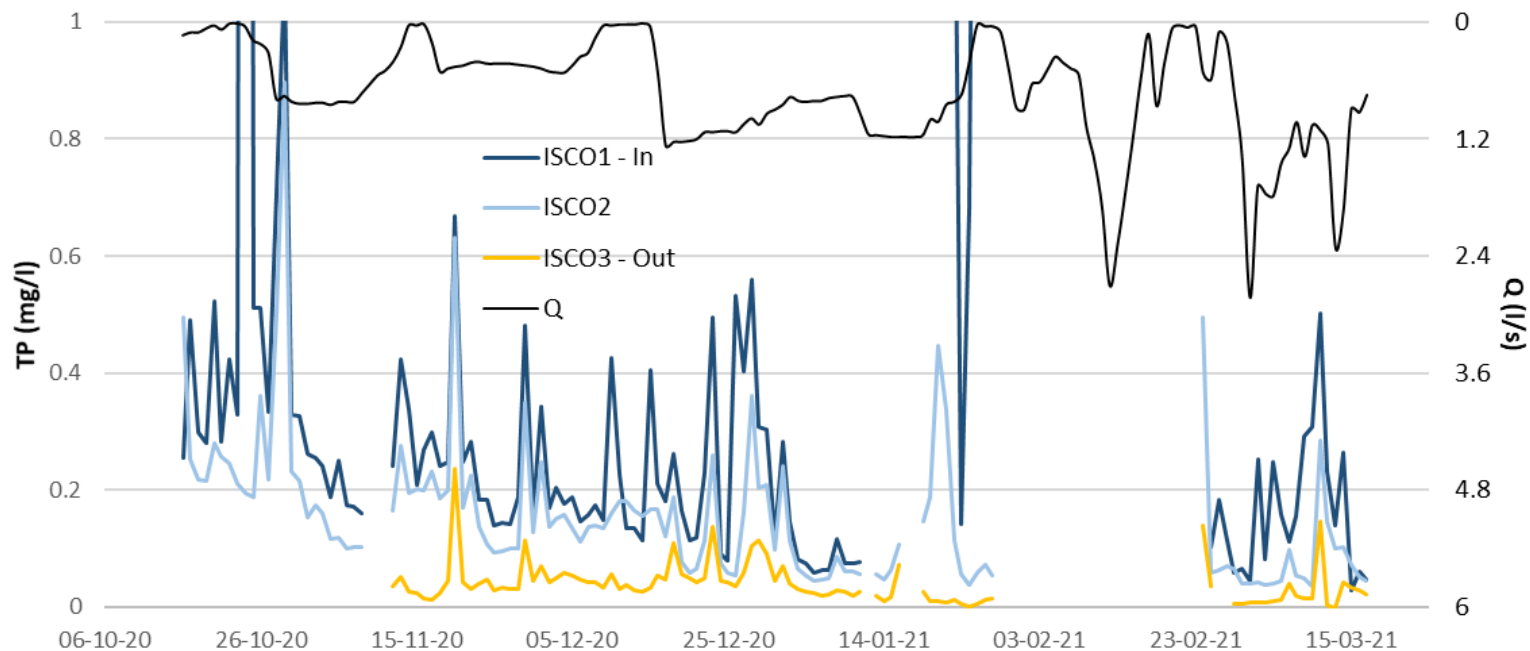


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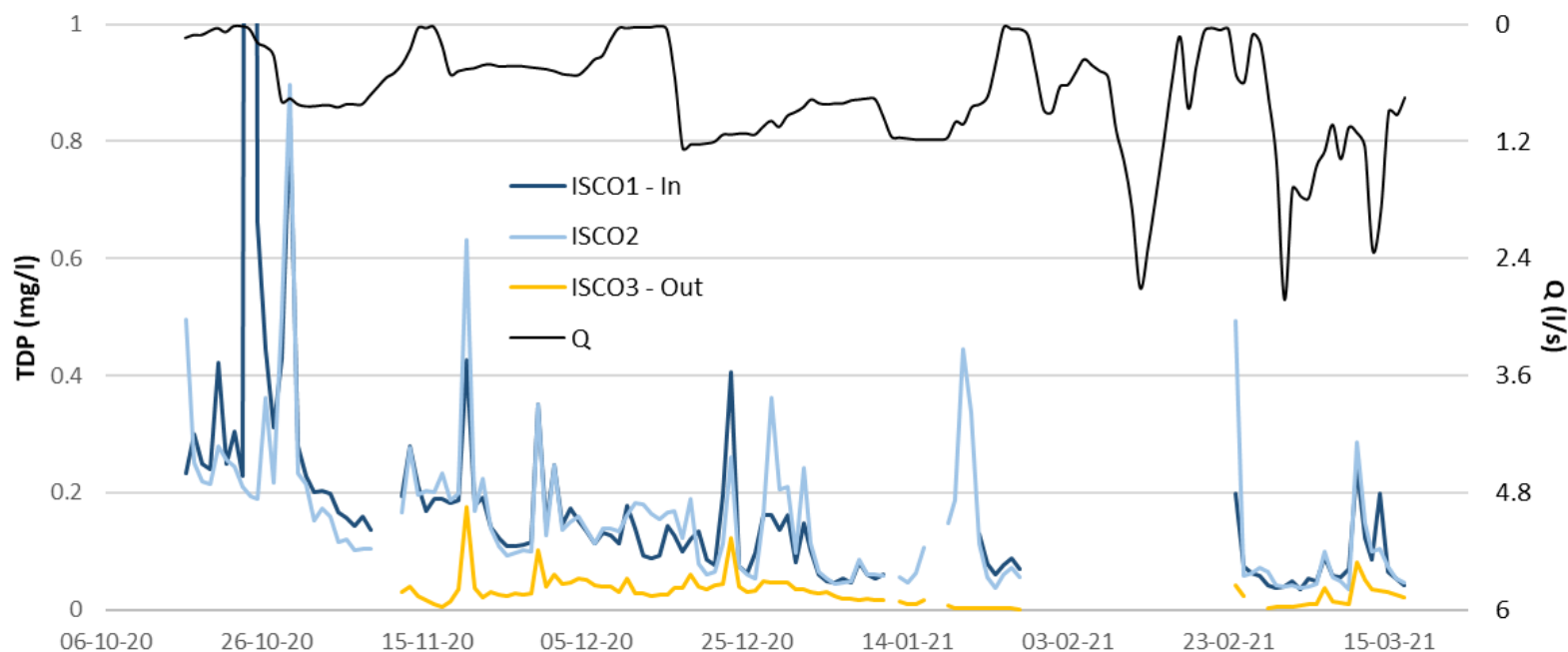
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TDP – Fensholt D3



Monthly data overview



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Month	Q (m ³)	Sediment filter				Reactive filter (ICS)					Overall system
		TP load (g)	TP removal (%)	TDP load (g)	TDP removal (%)	Q (m ³)	TP load (g)	TP removal (%)	TDP load (g)	TDP removal (%)	TP removal (%)
okt-20	613	243	30	190	23	61					
nov-20	1299	276	31	207	16	130	19	76	17	79	83
dec-20	1798	448	28	250	2	180	25	59	20	63	73
jan-21	2133	253	48	74	20	213	20	72	8	72	80
feb-21	1825	13	35	17	16	182	3	67	1	60	78
mar-21	2146	371	37	167	16	215	16	70	12	68	79

Incomplete monthly data

- Compact filter systems have shown good potential for removing particulate-bound and dissolved P from tile drainage
- Technically challenging to develop a filter system with large hydraulic capacity (peak drainage flows) and high P removal efficiencies
- Problems with upscaling were observed in DK systems primarily in connection with particulate-bound P
- Compact filter system require maintenance during operation
- Both sediment and spent filter material can potentially be recycled on agricultural fields as soil amendment.

- The monitoring program will continue at both field facilities
- Improved sedimentation (physical and/or chemical) and overall P removal efficiency
- Study of P transformations under varying redox conditions and drainage flow characteristics
- Study of the interactions of the removal pathways of particle-bound P in a long term operation mode