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**Planter og Miljø**

## **WP 5 - TRENDS**

**TReNDS**

Transport and Reduction of Nitrate in Danish Landscapes at various Scales



**Innovation Fund Denmark**

RESEARCH, TECHNOLOGY & GROWTH



# WP5 - EMISSION BASED REGULATION

Hypothesis H: In collaboration with stakeholders, new concepts for emission based regulation can be developed that allows the inclusion of local scale data and observations in future national regulations.

		2015				2016				2017				2018			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>5</b>	<b>Emission based regulation</b>																
5.1	Catalogue of instruments to reduce nitrate load																
5.2	Monitoring concepts and techniques for emission based regulation																
5.3	Test passive sensors for in stream control monitoring																
5.4	Stakeholder involvement in evaluation of emission based monitoring																
D5.1	Principles for emission based regulation (papers/guidance)																
M5.1	Monitoring concepts ready for test																

# 5.1 CATALOGUE OF INSTRUMENTS TO REDUCE NITRATE LOAD

- Current knowledge described
  - In sketches
  - In photos
  - In simple words

miljøtiltag  
**MINIVÅDOMRÅDER MED ÅBNE BASSINER I KUPERET TERRÆN**

Et minivådområde med åbne bassiner anlægges i tilknytning til markdrænen og fungerer ved, at drænevandet ledes over i åbne bassiner, hvor processer som sedimentation, planterøg og biokemi medvirker til at reducere koncentrationen af nitrat og fosfor.

**PLACERING OG ETABLERING:**  
Minivådområder skal placeres i forbindelse med et dræningsland på mindst 20 ha og tilpasses terrænets hældning, for at undgå opstuvning eller tilbagehold i dræner. En effektiv form for udvaskning af vand kræver, hvis størrelsen på et minivådområde er på 2% af dræningslandet.

**OMKOSTNING**  
Etableringsudgifter ligger mellem 270.000-530.000kr. for 1 ha.

**EFFEKT**  
**N-effekten** varierer mellem **20-30%** afhængig af dræneafstrømning og det aktuelle N-køb fra marken.  
**P-effekten** varierer mellem **30-50%** afhængig af det aktuelle P-køb fra marken.

**SÅDAN VIRKER TILTAGET**  
Underrubrik forklarer lidt mere om, hvad det er tværsnittet viser.

Og måske er der brug for nogle yderligere detaljer, som kan beskrives her.



KOMPENSATION  
Der ydes kompensation for etablering under Landdræningsprogrammet 2017-2020.

SEGES

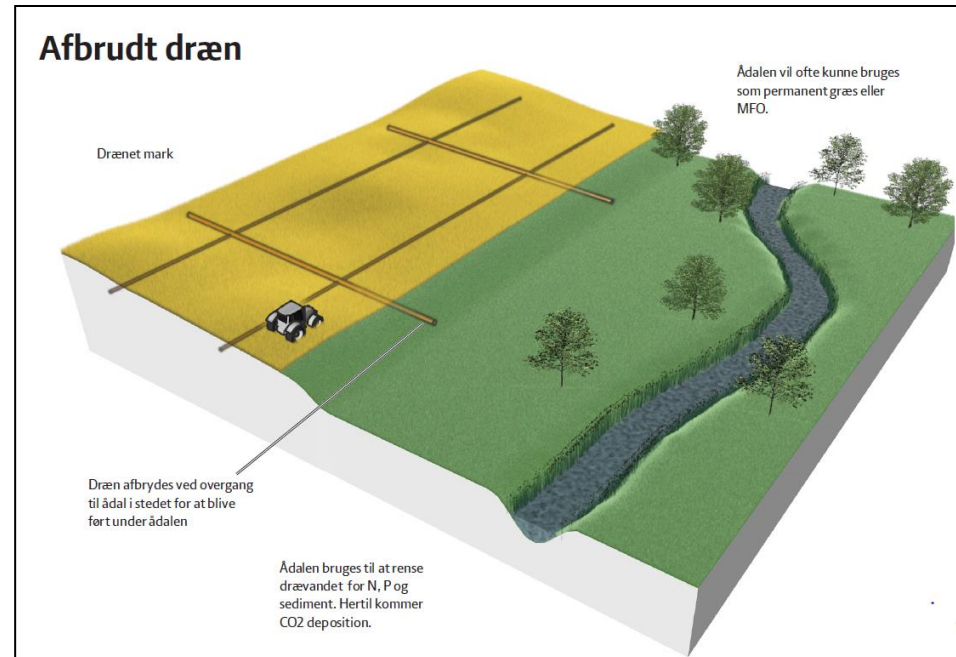
## Afbrudt dræn

Drænet mark

Ådalen vil ofte kunne bruges som permanent græs eller MFO.

Dræn afbrydes ved overgang til ådal i stedet for at blive ført under ådalen

Ådalen bruges til at rense drænevandet for N, P og sediment. Hertil kommer CO<sub>2</sub> deposition.

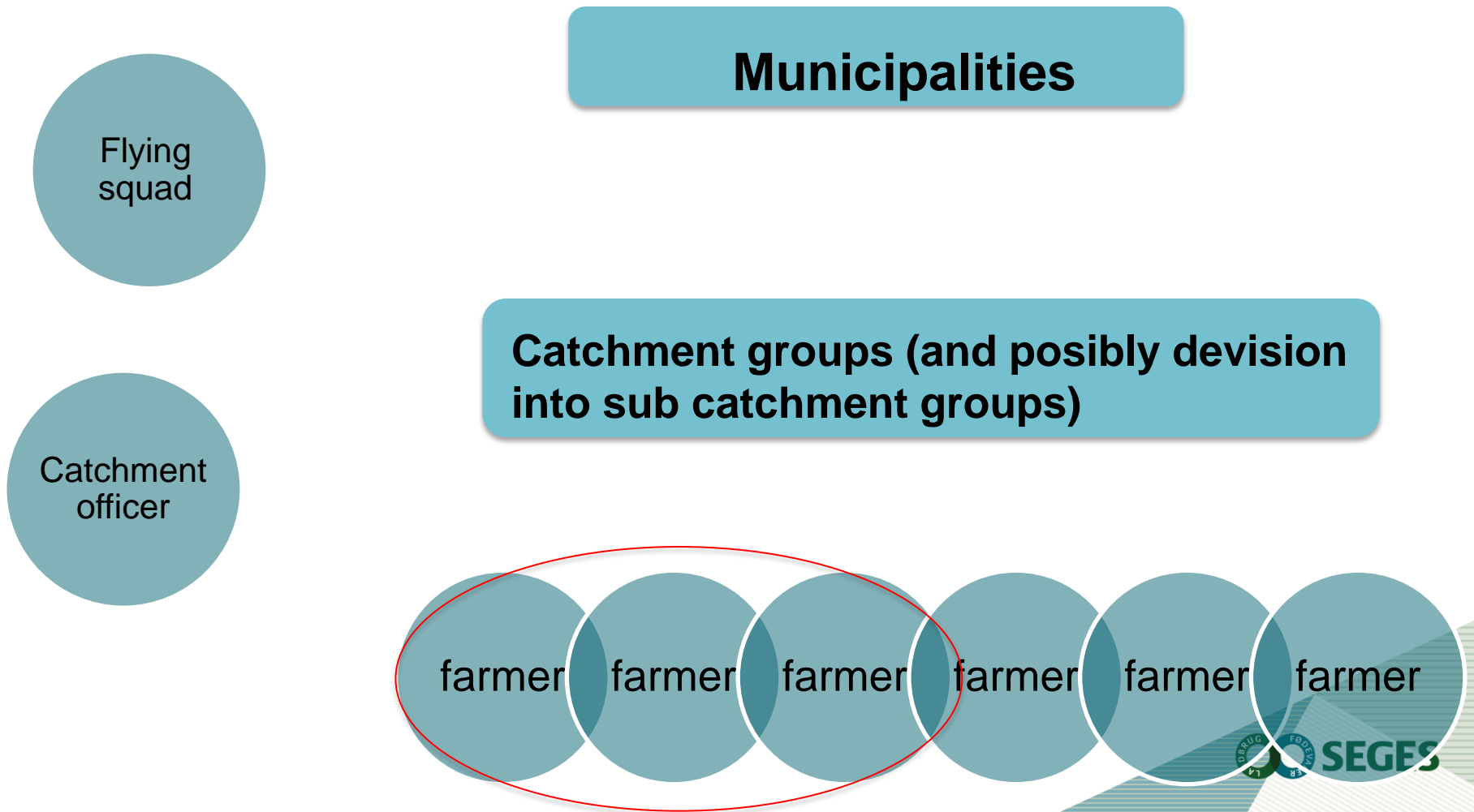


## 5.2 MONITORING CONCEPTS AND TECHNIQUES FOR EMISSION BASED REGULATION

- Concept
- Techniques (Camilla)

# CONCEPT

ENVIRONMENTAL MEASURES ARE TO BE INITIATED “FROM THE BOTTOM” IN ORDER TO SUCCEED



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# OVERVIEW

- **Catalogue of instruments to reduce nitrate load**
- Presentation of equipment
- Own impressions
- Laboratory test
- Field test with consultant and farmers
- Field areas (Holtum and Fensholt)
- **Monitoring concepts and techniques for emission based regulation**
- **Contact to farmers**

# EQUIPMENT

Method	Product	Range (mg NO <sub>3</sub> <sup>-</sup> -N L <sup>-1</sup> )	Protocol	Waist
Nitrate sensor	NeuLog NUL-241	0,1-14.000	Appendix 1	Non
Nitrate sensor	YSI Professional Plus	0-200	Appendix 2	Non
Nitrate sticks	AquaChek	0-50	Appendix 3	Nitrate sticks
Spectrofotometry	Spectroquant Colorimeter	0,3-30	Appendix 4	Cadmium





# USABILITY OF EQUIPMENT



[http://www.123rf.com/stock-photo/landscape\\_architects.html](http://www.123rf.com/stock-photo/landscape_architects.html)



<http://www.albertmorell.com/4160/470463/projects/farmer>



<http://hagenspot.blogspot.dk/2007/11/car-trubble.html>



[www.shutterstock.com](http://www.shutterstock.com) · 234423355

<http://www.shutterstock.com/similar-113272825/stock-vector-chemical-laboratory-ware.html>

# METHOD OF TEST IN LAB

- Aim: Determination of accuracy and precision of equipment for nitrate measurement in drainage water.
- A test of the equipment is made in order to determine a standard curve of potassium nitrate made in milliQ water in order to *examine the linearity within the measuring area and the stability of the calibration.*
- Test of drain water; whether the measurement methods are exposed to a matrix output from the drain water.
- Each equipment is tested within its range.
- The equipment is calibrated due to the product directions.

# METHOD OF TEST IN FIELD

- Aim: The purpose is to gain experience with the use of measuring equipment for farmers and consultants

- 2 experiments

## **1<sup>st</sup> experiment (Fensholt)**

1. Training of consultant
2. 3 visits with 3 landowners/farmers
3. Registration of measurements in drains and comments on the equipment (consultant and farmers)
4. Evaluation with SEGES and interviews

## **2<sup>nd</sup> experiment (Holtum)**

1. 1 visit with 2 farmers and consultant
2. Observation/interviews/perspectives

# EXPECTED RESULTS

- Expectations of equipment and method
- Needs of farmers
- Needs of consultant
- Hand experience of farmers
- Hand experience of consultant
- Possible uses for the equipment
- Fulfilment of expectations
- Perspectives on monitoring concepts and techniques for emission based regulation
  - App concept for registration of data → database for consultant measurements (Water shed officer)